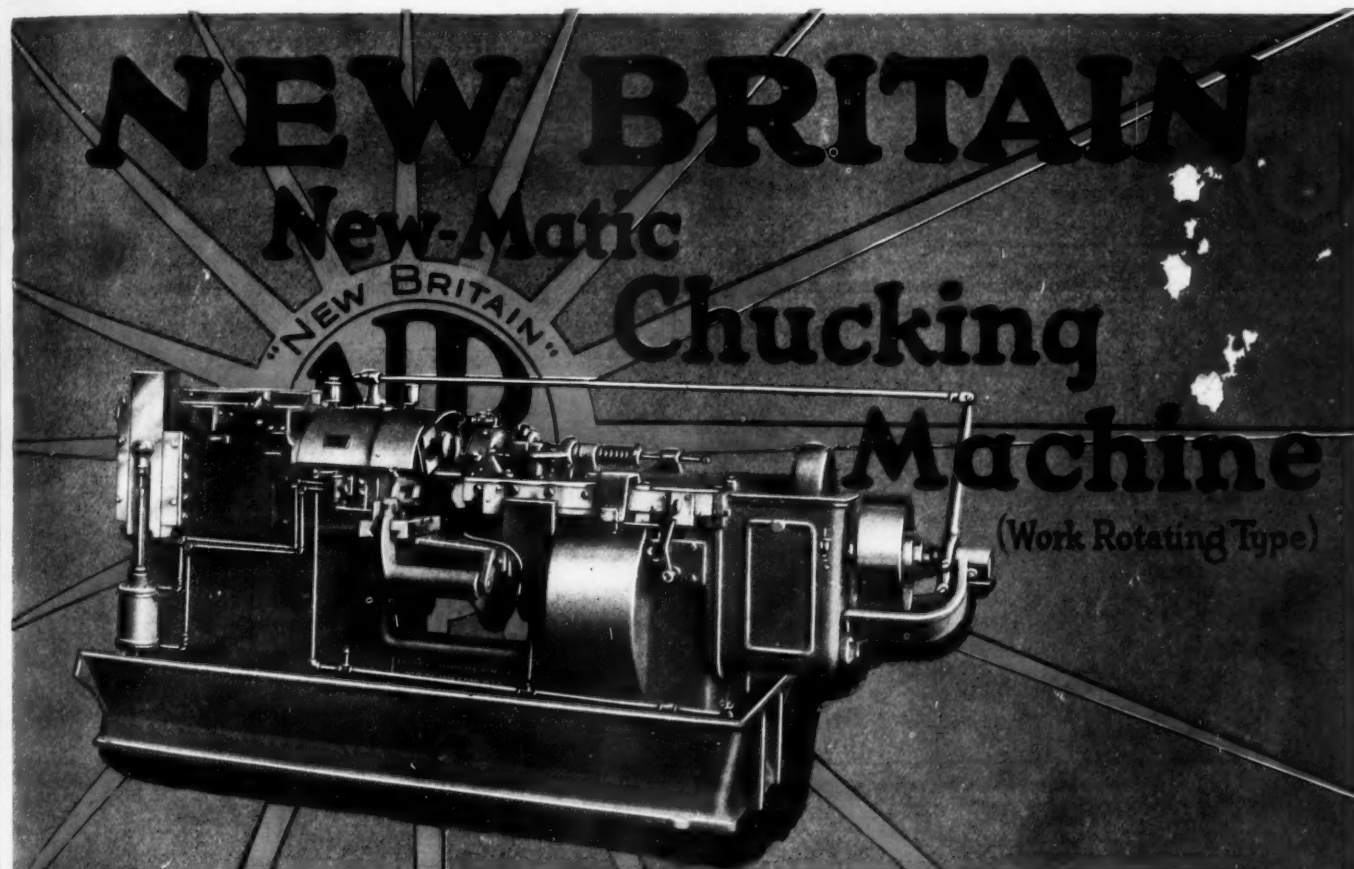


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AUTOMOTIVE INDUSTRIES

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Small Cars are Coming— *Will They Succeed?*

General opinion is that an Americanized type with more power and leg room than the light European models will find considerable market.

By Norman G. Shidle

THE market in this country for light cars of the European type with narrow tread, small 40 to 100 cu. in. engine and relatively cramped accommodations is not likely to be large, at least at the present time." This appears to be the consensus of opinion among leading executives of the American passenger car industry and of most other observers who have been looking into this question in recent months.

Why then all the light car talk that has been going the rounds in the industry for the last six months or a year?

Americanized Version

That question can be answered quickly. While it might be difficult to sell the American public on a really European type of light car, there have been definite indications of a growing popularity for small cars in this country for a number of years. Consequently an Americanized version of the European light car, a number of men in the industry

IT is likely that several cars built along new and smaller lines will be on the American market before long, since several manufacturers are known to be experimenting with vehicles of this type.

The trend toward smaller cars in general has been manifest for some years in all price classes and sizes. An Americanized version of the European light car would be another step in the same general trend which has been going forward for some time.

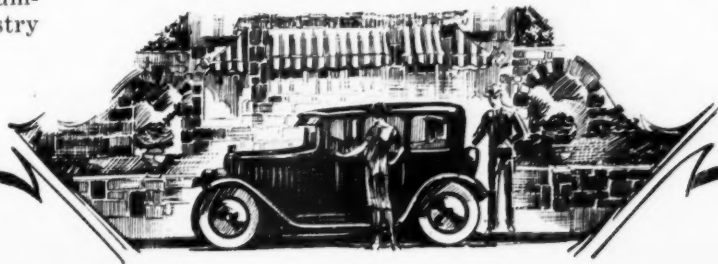
believe, might have a considerable sale here as well as abroad. And if current rumors are well founded, anywhere from two to five small American models of this kind are to be expected on the market before the end of 1926.

The European Type

What is generally known as the European type light car is characterized by an engine with very small piston displacement; a narrow tread, ranging from 38 to perhaps 48 in. as against the American standard tread of 56½ in.; and a relatively short wheelbase. Such cars also are light in weight and usually provide rather small quarters for passengers as gaged by ordinary American practice.

What advantages have cars of this type over the ordinary American type of car? Listed briefly, they are usually considered to be:

1. Economy in operation. Fuel consumption is low and tire costs and other similar items of upkeep



are correspondingly low.

2. Economical from tax standpoint, where tax is based on horsepower, piston displacement, or weight.

3. Easy to maneuver in traffic because of small size.

4. Require small garaging and parking space.

The European type of light car has these advantages over larger cars, whether it is operated in the United States or in some other country. But, obviously, the relative importance of the advantages vary in different countries.

Where gasoline is expensive and horsepower taxes high, the value of the peculiar characteristics of the European light car become very marked. But when gasoline sells for somewhere between 18 and 30 cents a gallon, or less, and where taxes amount to a relatively small item in car ownership, the importance of the economy features of the light car dwindles very materially. The truth of this fact is indicated by experience in recent years. The European type of light car has found popularity chiefly in those countries where taxes are high and where gasoline is expensive. Thus far it has been impossible to interest the American public in such a car, although some minor attempts have been made.

So far, however, no attempt at production of a light car of this type has been made by an important manufacturer with money and merchandising facilities already established. And when we discuss the possibilities of light car production by an American manufacturer we must take into serious account the growing export market.

Foreign Markets a Factor

An American manufacturer might, even with a purely European type of light car, sell enough vehicles in this country in addition to the number he sold to his export markets to bring his production total to a higher point than that which has been attained by any European manufacturer, thus permitting him to compete in foreign market with this type of car on a particularly advantageous basis.

At the present moment this combination field seems to offer the only important commercial opportunity for the production of a strictly European type of light car by an American manufacturer.

An European manufacturer may be the first to attempt this combination. If the Peugeot organization, which already is selling in foreign markets, sets up an American manufacturing plant for its 86 in. wheelbase car it will be somewhat in the position of seeking a sufficient part of the American market to permit quantity production for foreign markets. In its French plant, as a matter of fact, Peugeot already is said to have reached an output as high as 250 a day over a considerable period.

But an Americanized version of the European light car quite conceivably might obtain a good market in the United States. The Americanized version would have to sacrifice those advantages of the European type which are of least value in this country, substituting for

AN Americanized version of the European light car would differ from other American cars of similar wheelbase in appearance, would have a smaller, higher-speed engine, probably would give more miles to the gallon, be capable of traveling at greater average speed, and have somewhat smaller overall dimensions.

The price of a car of this kind doubtless would be a bit higher than that of other cars of similar wheelbase and piston displacement because of the special features of construction and qualities which would be incorporated in it.

them advantageous such as greater power, elimination of necessity for constant shifting of gears, ample leg room for passengers, etc., which are of particular value in selling to the American public. Standard tread and at least 100 in. wheelbase probably would be necessary in order to permit incorporation of these latter characteristics.

The Americanized version, however, could preserve the light car advantages of light weight, easy handling, maneuverability in traffic and, to some extent, of low tire upkeep. In other words, it would provide a vehicle for that section of the American public which wants a snappy, small, easily-handled car but which cannot bring itself to forego the advantages of reasonably high power and sufficient room for comfort.

Such a car, it would seem quite properly might be called an Americanized version of the European light car, because it would be built primarily to meet the needs of the American market. It would differ from other American cars of similar wheelbase in appearance, would have a smaller, higher-speed engine, probably would give more miles to the gallon and would have somewhat smaller overall dimensions. Its advantages in some export markets would not be so marked as those of the European type of light car, because its relatively larger piston displacement would mean that taxes on it in foreign countries would be just about as high as those on some cars already existing. The price of a car of this kind doubtless would be a bit higher than that of other cars of similar wheelbase and piston displacement because of the special features and qualities which would be incorporated in it.

A recent statement from an advertising agency handling the account of a prominent passenger car manufacturer mentions "a small car, of what may be termed short wheelbase, with the speed and endurance of larger cars, short turning radius and quick acceleration ability, able to negotiate American ideas of hills on high gear," and says:

"One experimental car of this nature, on a 270 mile trip through Michigan, Indiana and Illinois, maintained a road average of better than 35 m.p.h. despite the fact that several populous cities were traversed and the drive was made on a Saturday when the road traffic was heavy. This car was driven at 60 m.p.h. It was equipped with a four-cylinder motor of small bore and long stroke, turning over at high speed. It was practically free of vibration at ranges of 30 to 40 m.p.h. and at its maximum speed showed no signs of stress or strain. It showed 28 miles to the gallon of gasoline and the oil consumption was about 250 miles to the quart."

It is not unlikely that several cars built along these general lines will be on the American market before long, since several manufacturers are known to be experimenting with vehicles of this type. The trend toward smaller cars in general has been manifest for some years in all prices classes and sizes. The Americanized light car would be only another step in the same general trend

which has been going forward for quite some time.

That the American industry is pretty well agreed about the unlikelihood of a strictly European type of light car making much headway here at this time, but that the possibility of success for some Americanized type is admitted is indicated by definite—although confidential—opinions on this subject which have been expressed to *Automotive Industries* by the presidents of a number of leading car companies.

One chief executive, who says he has been doing some thinking on the subject, for example, says:

"In spite of the rapid increase in easy riding cement roads, I do not think that the light car which involves a narrow tread will, for a long time to come, be popular in this country to the extent of becoming a quantity production proposition, which is absolutely necessary to make the price. Narrow gage cars are impossible on country roads and not so good on our improved gravel roads, at least a great deal of the time.

Don't Like to Eat Dust

"If the light car is to be a roller-skate affair—low to the ground—the luxury-loving American public won't take to it because they don't like to eat dust; that is the thing that kills the low-hung, rakish speedster—the kind where you lie on your back under the steering wheel and strangle.

"The light car, of necessity, is a car of limited room. Right now everybody seems to be yelling for more and more room. The two ideas do not seem to go together. The light car, while it may be snappy in appearance, can never be luxurious or impressive. Even Mr. Ford is realizing that people are demanding both of these things today as never before.

"The only real advantages of the light car are economy of garage and parking space and economy of operation. No one would build a garage just to fit a light car, however; and parking conditions are terrible even for a Kid-die-Kar. Economy of operation is not a major sales factor today.

"Of course, if some one comes on to the market with a light car of the European type, storms the country with advertising, pays great attention to snappiness, that car, for these reasons, and because of its novelty, will have its vogue; and its vogue may be impressive.

"But just as soon as that happens, the light car is going to be the target for all of the standard car salesmen. An avalanche of "unselling" is going to take place, directed at the points in which the light car is most vulnerable."

Another passenger car company president is equally confident that "American buyers will not take to the light car as foreigners have." He believes that "the average

American automobile owner takes more pride in his car than foreigners do and would rather have a real man-sized car."

The element of pride is stressed by another chief executive who adds that "our public has more money to spend on automobiles than the people in European countries who are putting up with the small light cars. As long as we can secure cars of the size and performance of the Chevrolet at present prices, I do not believe that the American public will buy a smaller car with less performance.

"I do believe," this executive goes on, "that there is a market for a car in the size of the Ford and Chevrolet with more quietness, smoothness and quality built into it, but of course this would mean a higher selling price than the Ford or Chevrolet rather than a lower one."

The president of another car organization admits that there is considerable activity along light car lines by several different manufacturers, but questions seriously "whether a product of this nature ever will become popular in this country."

One executive says that "the small car is already here. While it cannot be said that we are building cars as small as some of those built abroad," he adds, "I do not believe that the American people will be inclined to use such small cars as might be popular over there, because it is distinctly an American characteristic to want a big package for the money. Most of our people want to look as if they had a big car, yet they want to pay a small sum for it.

More Refined Construction

"The American cars of smaller sizes have not been much improved during the last ten years. . . . I look for some of the large volume producers to build smaller cars, more refined, more economical and less of the big package type than they are producing today.

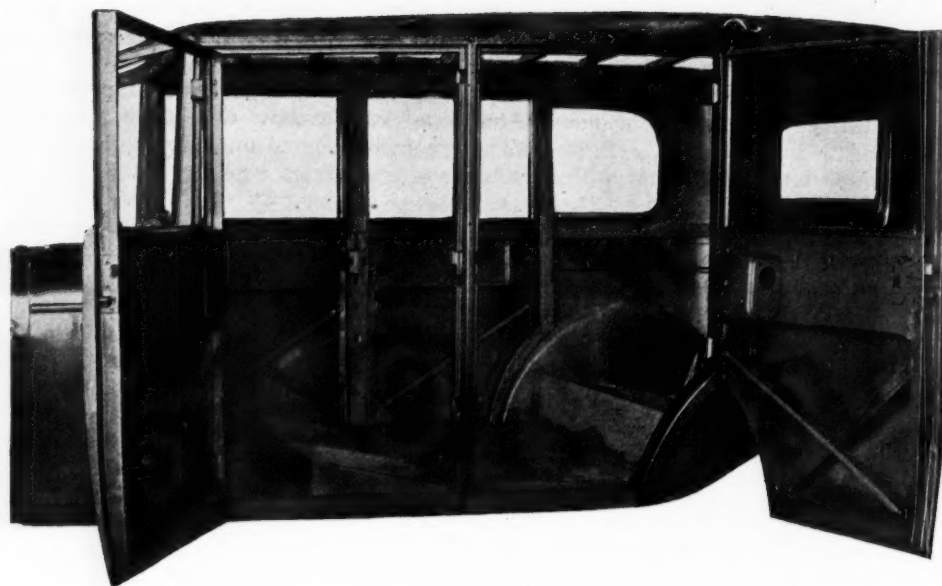
"That will mean the real advent of the small car."

The head of another important passenger car organization says, "I have not given enough attention to the European type of small car to comment on it in any very great detail. I have a vague suspicion that there is a considerable market for smaller design of sport model, but just what it is, I do not know."

Other conversations and letters with men in the industry follow along much the same lines as the examples quoted. Nearly everybody has been doing a bit of thinking and talking about the possibilities of some sort of light car in the American market. Speculation about possibilities has been rife. Within the next two or three years, experience probably will have shown whose opinion is the most nearly correct.



FIG. 1. Ajax sedan body at head of trimming line. Doors are all steel as are door lock pillars and windshield frame. Sill and roof frame assemblies are wood



Production of Closed Bodies Simplified by Sub-Assembly Methods

Finished cloth panels and prepared strips of leather fabric also facilitate final operations on Ajax bodies at Seaman plant. Unusual checking system used.

By Walter L. Carver

USE of sub-assemblies, finished cloth panels and prepared strips of leather fabric, etc., has simplified the assembly and finishing of Ajax closed bodies at the plant of the Seaman Body Corp. of Milwaukee.

While the sill and roof frame assemblies of these bodies are wood, pressed steel is used very liberally. Both front and rear doors are all-steel construction, in which a window frame structure is telescoped into the lower panel and welded into place. Additional strength is built into the lower panels by diagonal steel straps which are spot welded at the ends. The cowl and windshield frame are all-steel as are the lock pillars. The wood sills carry the wood dash at the front end and terminate at the wood rear door pillar at the rear. Beyond this point the lower portion of the body is steel and incorporates a light wood structure including a rail at the belt to permit tacking of the body lining.

In the construction of the body, the sub-assembly method is followed. The complete roof frame is assembled in a jig where each detail wood part fits into exact position. The sheet steel form for the roll edge at the top is tacked into place and all joints are glued and screwed. An interesting detail apparent in the construction of the top and used at all points where wood forms one or both members is a narrow strip of relatively thin felt placed between the two members before they are glued and screwed in order to prevent the possibility of squeaks in service.

In another jig, the sill assembly which carries the wood dash is assembled and ironed. Doors are produced in a

separate all-metal department, while the stamped forms for the cowl assembly are brought together at special fixtures. The lower rear portion of the body wall is a single stamping. This and the wood frame members and upper metal work, again a single piece, are all assembled before attachment to the sill assembly. Rolled steel molding conceals the joint between the upper and lower panels of the rear assembly.

Fig. 1 shows the general make-up of the body as it approaches the trimming line. The rear seat pedestal is pressed steel construction and the inclined base for the front seat is of the same material. Following the assembly as shown in this view, the body is passed through the paint department, where oil undercoats precede the Mimax finish. Throughout the paint shop and finishing lines, bodies are mounted on castored trucks.

Enameling and Striping

At the head end of the trimming line, beads are given a coat of black Japan enamel and the gold striping is brushed on. Following these operations, the body is pushed on to one of the three trimming lines, the track consisting of one channel and one flat rail. No conveyor chain is used and bodies are moved from station to station by hand.

Due to the group payment plan which is effective on the trimming lines, the number of men employed is not great and the stations are not sharply marked by the efforts of the men. In fact the three trimming lines are noteworthy by reason of the cooperation which is shown throughout



Fig. 2. Assembled trimming strips for door openings. Baker velour and weather strips are carried on veneer strips and attached by special flat head machined screws

their entire length.

Another unusual feature is the method of accounting or checking in detailed operations. When the body leaves the paint shop a perforated pad is tacked on the front of the dash. This pad contains slips which are numbered to correspond to the various operations. When a man has completed his portion of the assembly and trimming program, he tears off the slip bearing that number. These slips when turned in constitute the basis of the bonus scheme and also serve as checks on each operation.

At the first station in the trimming line, the window lifts and wiring for the dome lamp is installed, while the joints around the roof line

assembled strips, as shown in Fig. 2, complete the trim around the front door opening. The upper strip which fills the space between the tops of the doors and the roof trim extends backward to the cloth which has been tacked into the rear quarters and back of the body.

In Fig. 2, the right and left strips for the windshield posts are at the extreme right. In the center are the two strips for the pressed steel door lock pillar and at the left are the two door top trimming strips. Three-ply wood veneer is the foundation of each of these strips. The cloth, which is Baker velour, is stretched over the front and attached at the back edges.

The method of attachment is quite novel. As can be seen in Fig. 1, five square holes are punched in the inside surface of the door lock pillar. Behind each of these square openings is located a square machine nut which fits loosely in a pocket formed by the pressed steel structure. Although more or less free in the pockets, these nuts may be said to float, as they are restrained against turning. Mating holes are drilled in the veneer strips before application of the cloth. When the strip is held in place, the operator can feel the holes in the veneer through the cloth. Then he punches holes in the cloth at these points by means of a screw driver or sharp hand punch and inserts a flat head machine screw.

The edges of the cloth are pinched under the bevel head of the machine screw as it is turned down into the nut. This machine screw is special in that its head is tapped out to receive another smaller machine screw. The head of the second smaller screw is covered with the same cloth as is used to line the body in the form of a relatively flat button. After the larger machine screw is seated firmly, the small screw is turned in by hand and finishes off the appearance with no metal exposed.

These special screws are used in later operations at many points in the interior of the body. Rear and quarter window frames, which go on the outside of the body to cover the cloth which was turned over, are attached by this means. Similar screws are used to attach the front and top of the rear lower quarter panel which is installed in the next group of operations.

This panel, shown in Fig. 3, also carries the lower curved section of the weather stripping for the rear door, the balance being incorporated with the strip which covers the door post above the belt. Coincident with the installation of this panel, the door check brackets are screwed into place and another man installs the felt guide channels and sash in the doors.

In the course of the operations described in the previous

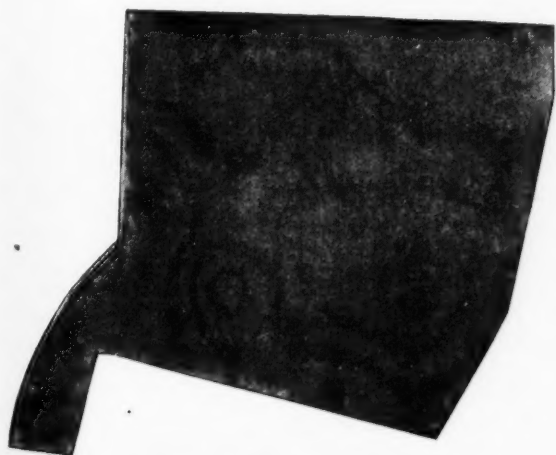


Fig. 3. Lower rear quarter panel, assembled and attached in same manner

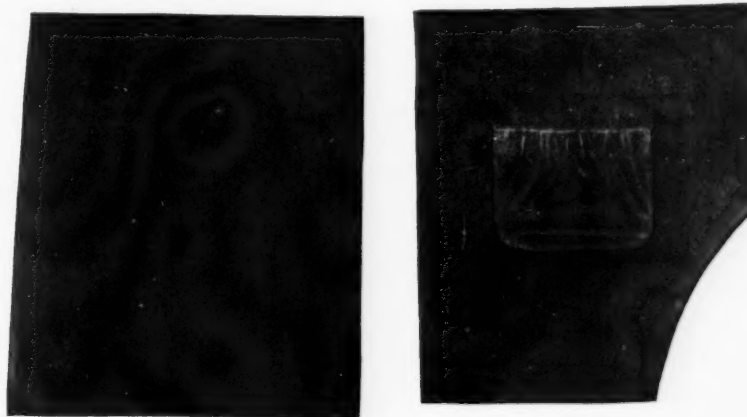


Fig. 4. Door panels are held flat by steel clips attached to back of veneer base and are further secured by screws which attach door hardware



Fig. 5. Front seat back sub-assembly. Is attached similarly to trim strips. Springs and wadding are inserted and then seat is finish trimmed in place

paragraphs, panels are applied to the inside of the four doors. Here again, three-ply wood veneer is the foundation and the Baker velour and padding are stretched over the front and fastened at the inside edges. On the backs of the door panels, flat steel clips are fastened. In the course of the application of the panel, these clips are forced in behind the steel structural members of the doors. In this way, the panels are held flat. These panels are held in proper place by the screws which pass through the door pulls, checks window control plates, etc. The same scheme of drilling holes in the veneer before application of the cloth is followed here. Fig. 4 shows the panels for the right front and rear doors just before application.

In the next portion of the assembly program the front seat back is installed. Fig. 5 shows the seat back as it is brought to the body. A sheet steel stamping forms the rear contour of the back and is covered by cloth and carpet which are fastened to the wood liners that in turn are fastened into the inner edges of the seat back. At the same time the seat back cloth is attached although the springs and wadding are inserted after the seat frame has been installed in the body.

Machine bolts passing through the ends of the seat back frame and screwing into nuts held in the steel pillar secure the back in place. Then the springs and wadding are inserted and the back is trimmed and taped around the edges.



Fig. 6. Complete rear seat back assembly which is hung on two hooks at top and secured by two screws at bottom

During the course of this work, the leather fabric is stretched over the top and tacked at the edges of the roof. In the design of the Ajax body the visor is made integral with the top and this arrangement affords another possibility for simplification and improvement of the trimming. Before the fabric is placed on the body, a wood strip is attached at the front end on the back of the fabric. This wood strip is fastened to the body under the visor frame at the top of the windshield opening. The leather fabric then is drawn forward, turned over the front edge of the visor and drawn to the rear end of the top. When the edges are tacked down firmly, wire-on moulding is applied to complete the joint between the top and the rear panel of the body. The joint at the side, extending from the front edge of the visor to a point just back of the rear quarter window, is finished by rolled aluminum drip moulding.

The last major sub-assembly to be installed is the rear seat back which is shown in fig. 6. The seat back is made up completely, including wadding, springs, etc., upon a wood frame. Two hooks are screwed to the top of this frame. These hooks attach to the body at the belt and two wood screws secure the lower edge of the back assembly. Another small trimming sub-assembly finishes the rear of the rear door pillar in the space ahead of the rear quarter window.

The lower portion of the body is finished by the rear lower quarter panel and the upper portion by the cloth which was tacked in during one of the early operations.

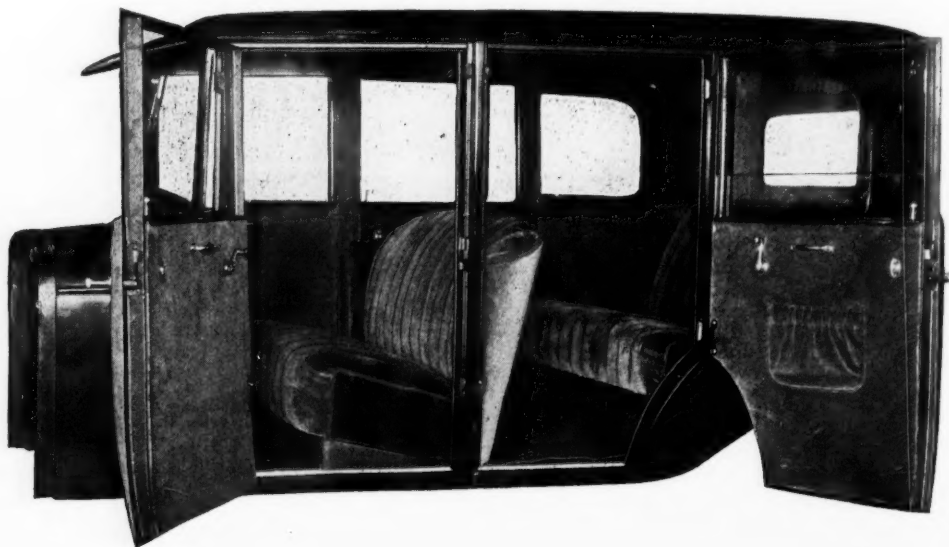


Fig. 7. Completely trimmed body before shipment. Front boards are installed after assembly with chassis

However, an unfinished spot is left along the rear pillar until a beveled strip upon which velour has been pasted is attached at this point. In this case finishing nails are driven through the cloth and the bevel strip into the wood rear door pillar. After these nails are seated, having been driven between strands of the velour, this cloth is picked slightly to produce complete concealment.

Fig. 7 shows the body at the end of the trimming line. The door checks have been removed to make the interior more visible. The efficacy of the special trimmed screw heads is demonstrated by this view as they are almost invisible.

While attention has been centered on the sub-assembly method of body trimming, the balance of the hardware and small trimming details are installed in fairly conventional methods. One interesting feature is found at the all-steel door pillar at the middle of the body. The sockets for the Ternstedt bumpers are formed directly in the steel members, thus eliminating the usual mounting brackets.

At the end of the line all bodies are given 100 per cent inspection and any necessary corrections or touch-ups of the pyroxylin finish are made before shipment by truck to the Ajax plant in Racine.

Bleaching Cracked Fuels

IT is well known that the majority of the gasolines produced by the cracking process have a yellowish tint. They also contain diolefines which in the course of time undergo a partial polymerization. If these fuels are used in internal combustion engines the polymerization takes place very rapidly, giving rise to the formation of a gum which causes the valves to stick.

Cracked fuels derived from the decomposition of lamp oil or gas oil, by the use of various catalysts, are also yellow and contain a small proportion of diolefines. Most of these fuels consist in large part of unsaturated hydrocarbons and cannot be refined with sulphuric acid, as the loss of useful hydrocarbons would be too great.

Many processes for bleaching these fuels and eliminating the diolefines have been suggested. They are based on the absorbing power of certain minerals. Use has been made of bauxite and of water glass, as well as of certain absorbing earths found in Florida, which do not affect the thylene hydrocarbons with a single bond. But all of these materials gradually lose their effectiveness and become inactive after having been used a few times.

According to a paper presented to the French Academy of Sciences by Prof. A. Mailhe, the use of metallic chlorides in a certain line of work, showed that they would play a role analogous to that of the Florida earths and of water glass. Tin chloride in particular reacts perfectly with cracked and synthetic gasolines so as to bleach them and eliminate all hydrocarbons that are easily polymerized. It plays the double role of a reducing and a condensing agent.

One hundred grams of the cracked gasoline, together with 10 grams of stannous chloride of a yellow color, are heated for an hour in a flask surmounted by a cooler. The liquid gradually becomes dark green. Boiling is continued until the reaction is complete. By cooling, the tin salt is separated out. The gasoline is decanted, washed with soda and water, and then distilled. It distills over in an absolutely colorless state between 167 and 338 deg. F., leaving as a residue a dark yellowish liquid, which is the product of the polymerization of the diolefines.

A gasoline obtained by this process remained absolutely colorless for five months. It did not produce any gumming in an engine and may be used in the same way as ordinary

gasoline. After the treatment of the fuel with it the stannous chloride is little changed, and can be used for additional operations. If it becomes less active it may be easily regenerated by means of hydrochloric acid.

Instead of effecting the reaction in the liquid state, it is possible to carry it through on the vapors of the gasoline. All that is necessary is to pass them over tin chloride heated to 390 deg. F. in a tube placed on a rack. After condensation the liquid obtained is washed with soda and with water and then distilled. The method is also applicable to crude benzols.

There are many metallic chlorides that are suitable for polymerizing the diolefines of cracked gasolines, but the bleaching power of most of them is greatly inferior to that of stannous chloride.

A One-Man Army Tank

A ONE-MAN tank has been developed for the British Government by Morris Commercial Cars, Ltd., of Birmingham. The original model was subjected to trials last August, and in the meantime an improved model has been completed and turned over to the War Office for tests. The following brief description of this machine, which is fitted with a standard Morris engine, is taken from *The Engineer*:

The tank is built of ordinary car components with the object of creating a demand for it—minus its military equipment—as an agricultural tractor and so facilitating and cheapening its military production. The chassis is standardized and on to it any type of body may be bolted. For military use either a one-man or a two-man armored body may be fitted or, alternatively, it may be equipped with a car body for reconnaissance work or with a fitting for an anti-aircraft gun. The chassis is carried on two endless tracks, each surrounding two main wheels. Behind it is supported on two disk wheels provided for steering purposes and to prevent the vehicle from toppling backwards when going up a steep incline. A feature of the design is the fact that the tracks are made of rubber. It is claimed that they can withstand a rain of machine gun bullets without their utility being impaired, for if they are pierced the holes close up immediately after the bullet has passed through them. The armored body carries a turret, above the upper edge of which the driver's head normally projects. When under fire the driver, by a touch on a lever, causes his seat to drop 6 in. In this position he secures vision through a horizontal slit in the turret at the level of his eyes. A vertical slit in the front plate of the turret provides an opening for a light machine gun.

A SURVEY of petroleum refineries, made by the Bureau of Mines, shows a total of 509 refineries in the United States on January 1, 1926. Of them, 352 refineries, with a capacity for treating 2,560,000 barrels daily, were being operated, while 157 refineries, with a total capacity of 290,000 barrels daily, were shut down. In addition, two refineries, of a probable aggregate future capacity of 5000 barrels per day, were under construction. A similar survey made by the Bureau of Mines as of January 1, 1925, showed a total of 541 completed petroleum refineries, with a total daily refining capacity of 2,827,000 barrels, and six refineries, with a total capacity of 37,000 barrels per day, under construction. On January 1, 1921, there were 415 completed refineries, with a total capacity of 1,889,000 barrels, and 44 refineries, with a total capacity of 77,000 barrels under construction.

New Study Made of Piston Design from Standpoint of Heat Flow

Investigations carried out at Purdue University lead to conclusion that head of uniform section is best from the point of view of heat flow. Many other details covered.

THE problem of heat flow in the pistons of internal combustion engines has been the subject of an extensive study by H. A. Huebotter and G. A. Young of the Engineering Experiment Station of Purdue University at Lafayette, Ind. Owing to the constantly increasing speeds of automotive engines it is highly desirable that the reciprocating parts, including the pistons, be made as light as possible, but as the sections or thickness of the parts of the piston are reduced, the ability of the piston to get rid of the heat which it absorbs from the burning gases is decreased, hence it is of the highest importance that the metal put into the pistons be so disposed or distributed that it serves most efficiently in carrying off the heat.

The research work was partly of a mathematical and partly of an experimental character and from the results obtained the following conclusions are drawn:

1. A head of uniform section is best from the point of view of heat flow.
2. The short barrel of tapered section is the best dissipator of heat.
3. A head section thick at the circumference will assist in the dissipation of heat. For this reason a large fillet is recommended at the junction of the head and the barrel.
4. The addition of metal to the head lowers the maximum temperature more than the same volume of metal applied to the barrel.
5. The barrel should be as thick as the head section at the head end and as thin as practicable at the open end.
6. Ribs, when properly designed, improve the conductivity more than an equal quantity of metal added to either the head or the barrel.
7. The proportions of the head, the barrel and the ribs that give the best performance are mutually dependent.
8. The triangular rib extending from the center of the head to halfway down the barrel is most effective.
9. A large number of thin ribs is superior to a few ribs of the same total thickness, since it gives better heat distribution over the head and the barrel.
10. Between 60 and 85 per cent of the total heat is dissipated from the ring belt, in the usual type of piston.
11. The conventional ring belt is about 60 per cent as effective as the piston skirt in dissipating heat with the same temperature difference.
12. The ring belt should be as short as possible.
13. A broad bearing land within the ring belt will improve the heat emission.
14. Piston rings should make good thermal contact with the piston.

15. A gray iron piston head section should be designed for conductivity rather than for strength.

16. Gray iron has the highest thermal conductivity when fine grained and homogeneous.

17. A low density, a low coefficient of expansion, and a high coefficient of conductivity should characterize the piston material.

A complete report of the investigations upon which these conclusions are based is published in Bulletin No. 25 of the Engineering Experiment Station. A very brief summary of the Bulletin's 114 pages follows:

Aims to be Kept in Mind

In order that the piston of an internal combustion engine may give maximum satisfaction in operation the following aims should be kept in mind throughout its design:

To transfer the heat absorbed by the piston head to the cylinder wall with minimum disturbance due to temperature.

To resist the fluid pressures in the cylinder without appreciable distortion.

To contain the minimum weight of material consistent with conductivity and strength.

To seal the open end of the cylinder against the passage of gas out of the combustion chamber and of oil into the combustion chamber.

To support the piston pin properly in the direction of the fluid pressure and of that of the cylinder wall side thrust.

To move in the cylinder with minimum friction.

Some of these requirements are contradictory, others are concurrent. The optimum piston proportions are those which unite the desirable qualities in a manner most suitable for the service in which the piston is to be used.

In order to arrive at a basis upon which to judge piston design, low temperature and light weight were selected as being especially important. Since the methods of securing these two conditions oppose one another, piston design must obviously be a compromise. Regardless of temperature and weight considerations it is important that the metal in the piston be distributed to give low head temperature and little skirt expansion.

Analyzed Mathematically

With these considerations in view the flow of heat from the working fluid to the piston head, through the head to the barrel and from the barrel to the cylinder was analyzed mathematically. Head sections of constant and of variable depth were studied under similar conditions of heat flow to determine their relative merits. Uniform and tapered barrel sections were investigated in the same way. The effect of rib design was demon-

strated by comparative tests. Finally the purely mathematical results were applied to temperature and sectional data derived from tests on a wide variety of pistons and the effect of piston rings and land clearances was computed.

In the analysis, two kinds of heat flow are recognized. Within the metal the thermal flow follows the laws of conductivity in a homogeneous medium. Under this condition the flow rate is given by the equation:

$$Q = KA \frac{T_1 - T_2}{l} \dots \dots \dots (1)$$

where Q is the quantity of heat measured in B.t.u. per minute; $T_1 - T_2$ is the temperature drop in Fahrenheit degrees in a distance of l inches; A is the area of the section in square inches through which heat is flowing and K is the coefficient of conductivity in B.t.u. per sq. in., per min., per deg. temperature drop in one inch.

If the heat is transmitted from one medium to another the rate of flow is expressed by the equation

$$Q = P A \theta \dots \dots \dots (2)$$

where Q and A have the same significance as in (1); θ is the temperature difference between the two media; and P is the coefficient of transfer in B.t.u. per sq. in., per min., per deg. of temperature difference.

The absorption of heat from the charge by the piston head and the emission of heat from the piston to the cylinder wall both follow the law given by equation (2).

These two equations will always suffice for the analysis of linear thermal flow, but their application is tedious. The solution of certain problems is attained more conveniently by developing the two equations through the method of Calculus to fit special cases of heat flow. The equations can always be used, however, in the forms given above if the special equations are not available.

Form of Section Important

In the design of the piston head one of the fundamental factors is the form of the section that will conduct the absorbed heat to the circumference with the smallest temperature drop and the greatest economy of metal. Three distinct types of head section are in common use—the section of uniform depth, the tapered section and the parabolic section. In order to simplify the investigation of their relative merits the following preliminary assumptions were made:

1. Temperature is constant over the full depth of the section.
2. The rate of absorption by the head surface per unit of area is uniform.
3. The temperature of the circumference is uniform.
4. The heat flow proceeds without radiation.

For the head of uniform section the temperature drop from the center of the head to any radius R was found to be

$$T_o - T_1 = \frac{H}{4Kt} R^2$$

where H is the uniform rate of absorption and t is the depth of the head.

The similar equation found for heads of tapered section in which the depth increases at a uniform rate from the center outward is:

$$T_o - T_1 = \frac{H}{2Kb^2} \left[b R - a \ln \left(1 + \frac{b}{a} R \right) \right]$$

where $a + br$ equals the depth of the section at a distance r from the center and \ln indicates the natural or hyperbolic logarithm.

For the head of parabolic section the following formula was found

$$T_o - T_1 = \frac{H}{4Kb} \ln \left(1 + \frac{b}{a} R^2 \right)$$

The uniform section was found to be somewhat superior to both the tapered section and the parabolic section under conditions of uniform heat absorption.

The heat absorbed by the piston head must be dissipated to the cylinder wall through the surface of the piston in contact with the cylinder. The transfer of heat follows the law expressed by equation (2) according to which the unit rate of heat flow from the piston to the cylinder is proportional to their temperature difference.

Investigations were made of heat flow through uniform and tapered barrel sections and it was found that with a given initial barrel temperature the tapered section will dissipate slightly less heat than a uniform section equal in thickness to the head end of the tapered barrel. For ordinary piston proportions the rate of emission of heat in the tapered section relative to that in the uniform section may be expressed quite accurately by the equation

$$E = \frac{I_1(xL)}{I_0(xL)}$$

where E is the efficiency of heat dissipation, I , a modified Bessel function, L the length of the barrel, and x , a transformation coordinate in which

$$x^2 = \frac{4P}{Kb^2} (a + bl)$$

Ideal Method of Designing

In designing a piston the ideal method would be to analyze each piston integrally as a three dimensional problem. Owing to the unlimited variety of piston proportions and working conditions the practical method is to dissect the piston into simple component parts which are treated individually for temperature change and collectively for initial temperature and heat flow.

Every piston can be resolved into a head disk, an annulus, and a barrel, and these three parts are mutually dependent for temperature and thermal flux. The method of trial and error involved in the solution of transcendental equations is satisfactory and the results obtained are reasonable in all cases wherein the flow may be considered two-dimensional, i.e. symmetrical with respect to the longitudinal axis of the piston.

After extensive analysis of a number of types of piston the following conclusions were arrived at:

1. A long piston barrel is not necessary for high thermal flow; in fact, whatever advantage the long barrel may have over the short one is the purely mechanical advantage of supplying a greater bearing area over the surface of the cylinder.
2. The short barrel piston is the most efficient dissipater of heat but its relative superiority decreases as the conductivity of the metal increases.
3. It is advisable to adopt a triangular rib extending well below the ring belt.
4. For highly conductive metal a uniformly tapering barrel section should be used, with the ring belt as short as possible.

The whole problem of designing for conductivity hinges upon the relation between absorption, conduction and emission. If the head temperature is low the rate of absorption will be high and the unit rate of emission will be low. Hence the barrel surface must be large, which means a long barrel. Since the low head temperature

limits the temperature drop between the center of the head and the open end of the barrel, the metal and sections must be chosen for maximum conductivity.

Design Suggestions

The following design suggestions are based on the information gained from the temperature-volume study of pistons:

1. Use a flat piston head with a section of uniform thickness.
2. Make the sectional depth at the upper end of the barrel equal to the depth of the head section before cutting the ring grooves.
3. Add whatever metal is removed by the ring grooves to the back of the section and insert a liberal fillet at the junction of the head and the barrel.
4. Make the ring belt no longer than necessary to hold the rings with just enough land clearance to prevent contact with the cylinder at the maximum temperature.
5. Make the skirt no longer than necessary for adequate bearing surface.
6. Taper the cross sectional area of the barrel uniformly to the minimum practicable thickness at the open end.
7. If plain sections are used put all the metal that can be allowed into the head end.
8. If ribs are desired, use the triangular form extending from the center of the head half down the barrel.

Tests With Cooling Water

A series of tests were conducted using various types of piston in which the heads were exposed to heat and the heat was carried off by cooling water in a manner very similar to actual conditions encountered in internal combustion engines. From information obtained during these tests the following additional suggestions were made relative to piston design:

1. A deep section at the center of the head is very effective in lowering the maximum temperature. For this reason a liberal center hole boss is recommended.
2. If ribs are used to reinforce the piston pin bosses they should extend to the center of the head.
3. The aluminum alloy piston has a wide margin of safety over the gray iron piston on a temperature basis.
4. The coefficient of emissivity at the piston skirt is approximately 0.007 B.t.u. per sq. in., per min., per deg. Fahr.
5. The ring belt dissipates about 60 per cent as much heat from a given initial temperature as that calculated under the conditions of thermal flow from the piston skirt. This efficiency is equivalent to a coefficient of emissivity of 0.0025, based on the coefficients $K=0.05$ and $P=0.007$.
6. The ring belt dissipates between 60 and 85 per cent of all the heat lost by the piston to the cylinder.
7. Radial clearance at the ring lands and below the bottom ring is detrimental to thermal emission.

Numerous graphs of piston temperatures are given in the report. The data on which these graphs are based were obtained not from pistons in an engine in actual operation but from a piston located in an inverted cylinder through which hot gases from a gas burner were circulated. These graphs bring out the fact that the drop in temperature between the center and the circumference of a piston head is much greater with cast iron than with aluminum pistons, thus indicating that with cast iron pistons the maximum temperature reached will be much higher. Other conditions being equal, the drop

in temperature in the piston head between the center and the circumference will be greater the thinner the head.

Some graphs are given also for aluminum alloy pistons of the type in which the skirt is separated from the ring belt. In all pistons the temperature at the top of the ring belt is the same as at the circumference of the head, because these locations are identical.

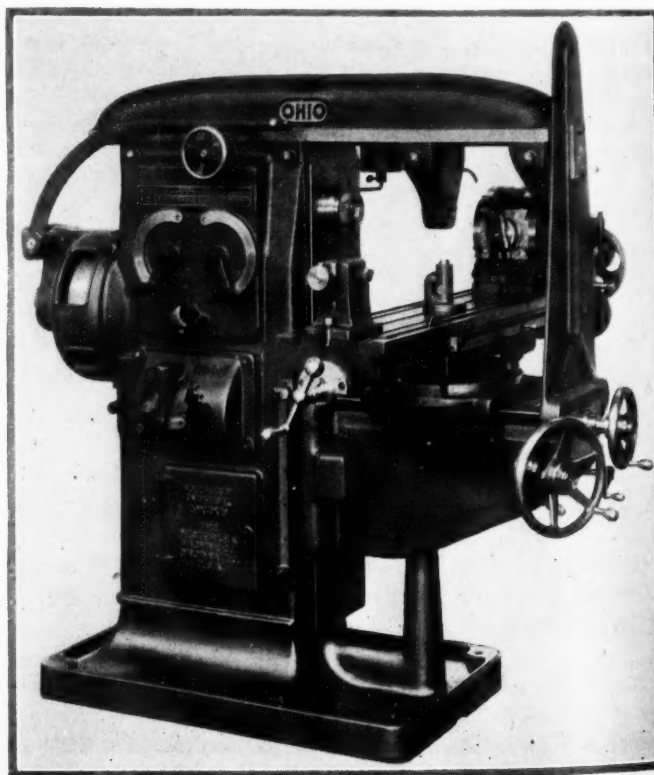
New Ohio Milling Machines

THE Oesterlein Machine Company of Cincinnati, O., has introduced a new line of Ohio constant speed or all geared milling machines. An innovation in the design of these millers is the Vee flat overarm. This is a heavy cast iron overarm of rectangular cross section, the name Vee flat being derived from the V and flat guides that form the bearing and provide alignment between overarm and column. In addition to providing perfect alignment of the arbor supports, the Vee flat overarm forms a broad and rigid surface to receive the upward thrust of the cut.

The overarm is clamped by means of a pair of T slot bolts at the front and a pair at the rear of the column. Each pair equalize and clamp by means of a nut at the side of the machine. The T slots in the overarm are placed as close to the V and the flat contact surfaces as possible, so that the clamping pressure imposes no strain in overarm or column.

The overarm is equipped with a rack that meshes with a pinion in the column. A handwheel is mounted on the end of the pinion shaft to provide a handy means of shifting the overarm. A feature of the Vee flat overarm is the ease with which it may be handled for the replacement of arbors or cutters. The arbor supports may be placed on the arbor and the overarm slid forward into position by means of the handwheel.

On both sides of the Vee flat overarm are gaging strips. These are finished surfaces that are scraped parallel with the center line of the spindle, and are used as locating or gaging points for squaring up work, or for the location of gage blocks when working to close limits.



Ohio Vee flat overarm type of milling machine

Just Among Ourselves

Department Stores as Airplane Outlets

AUTOMOBILE dealers have been suggested as logical outlets for airplane sales as that new industry grows in a commercial way. The suggestion has met with approval from some of the most prominent men in the aircraft factories and automobile dealers already are handling airplanes in several instances. That other methods of distribution may be resorted to, however, is indicated by the announcement that two large department stores have taken on airplane agencies. Aircraft Corporation of America announces in a recent advertisement that Gimbel Brothers in Philadelphia and Milwaukee and Kauffman-Baer in Pittsburgh will sell Sikorsky planes. Wanamaker has been handling Ford planes for several months.

* * *

List of Airplane Builders Growing

EVERY week or two seems to bring a new company into the commercial aeroplane manufacturing field. Quite recently two new companies, one in Kansas City and one at Detroit, both manufacturing planes selling for less than \$2500 have been added to the list. There are now 45 aeroplane manufacturers in the United States and the number is still increasing.

* * *

A Mistake Which Cost DePaolo \$6000

WHEN Pete DePaolo slowed down at the very finish of the 300-mile inaugural race at the new Atlantic City Motor Speedway, May 1, and by thus slowing down lost the contest by a hair's breadth, it was announced that "fuel line trouble" had caused his downfall. After the race, however, he is said to have confided to a friend, and the friend told us, that what really happened was this: His

main gasoline tank, which had a capacity amply sufficient to carry him 250 miles, the distance he had been accustomed to traveling on other board tracks, began to run dry. He knew he had a reserve tank but had never before been required to use it and when he tried to tap it on this occasion he suddenly realized that that he didn't know where to find the cut-in valve. He fumed

bled desperately around the instrument board while making a lap and a half at a snail's pace; then he managed to locate it, gave it a vicious twist and spurted back into the fray. He was too, late, however. Hartz had passed him and won the race. DePaolo's little aberration cost him \$6000—the difference between first and second prize.

* * *

Flat-Rate Service Charges Almost Universal

THE flat-rate system of making service charges has become so widespread in the last few years that it seems almost like the dim and distant past when a great argument was going on as to whether or not such methods were practicable. The progress that flat rates have made is illustrated well by a survey made recently by the St. Louis Post Dispatch which shows that out of 106 St. Louis dealers interviewed, 82 operate their service stations on a flat-rate basis, while 8 others have some operations on flat-rate and others on a time basis.

* * *

What Do You Know About Reception Rooms?

WE'VE been using up good white space on this page for several weeks giving our idea of what goes on in the heads of various types of reception room clerks who adorn the lobbies of automotive plants. This week our lucubrations on the subject are completed in the adjoining column—for the time being at least. That's no sign that the topic has been exhausted. If there is any type that we have missed or any special species which more experienced reception room boarders think need special attention, we'd be glad to hear about them. Maybe we can compile a book of "Memoirs of Gentlemen in Waiting." Reception room experiences are hereby welcomed.—N. G. S.

RECEPTION ROOM MONARCHS

No. 4. The Hostess

I CAN see how this job might be a terrible bore for some girls. But I like it. It's one of those jobs that high-powered executives are likely to refer to as routine or clerical; I get a kick out of trying to see all of its possibilities and handle them all so well that I can prove by example that doing a reception room job well really means something of importance to the firm. I like to live in pleasant psychological surroundings. And there's where my job has it on a lot of others; I can just about create the atmosphere that I'm going to work in. I can take an ill-tempered, nervous, fidgety man and with twenty seconds of courteous, pleasant and efficient treatment turn him into a reasonably calm being. Besides getting satisfaction out of doing a complete job effectively, I get an immense amount of personal satisfaction out of studying the natures, human and inhuman, that I have contact with every day. It's not all roses, of course; too many would-be funny men cracking moron jokes and too many hotsy-totsy boys trying to get social over a business contact just because I happen to be good-looking. But that's all in the game. This reception room is my business home and I try to take care of it in such a way that my guests will like to come back and will speak well of it when they leave.

Manufacturers Draft Preliminary Set of Standards for Bus Bodies

Specifications worked out at N. A. C. C. meeting in Detroit will be amplified and urged for adoption by all states in order to simplify production.

By John C. Gourlie

STEPS toward the solution of one of the worst problems of the bus industry—conflicting state regulations affecting body design and equipment—were taken at a meeting of motor coach, body and parts manufacturers held by the National Automobile Chamber of Commerce in Detroit May 6.

The group prepared a preliminary outline of proposed unified regulations, which, after refinement and approval by the manufacturers immediately concerned, will be submitted to a general committee of all associations of the industry, with the ultimate view of obtaining uniform action by state bodies.

As a prelude to this decision, those in attendance at the meeting heard George H. Scragg, of Mack Trucks, Inc., tell of some of the discrepancies and inanities of bus regulation that have made of motor coach body building a custom operation rather than quantity production. It was brought out that the cost of the body, under present conditions, equals that of the chassis, bringing the total cost of the job to an uneconomic figure.

Salesmen Add to Confusion

There was also some airing of a sore point in bus sales which cannot be ascribed directly to difficulties with state officials and laws—the disposition on the part of manufacturers to allow salesmen latitude in the matter of body specifications when selling prospects. Of course, with so many changes required by state regulation, a few others to suit the whims of customers might be overlooked, but it was emphasized that salesmen, for the good of the industry, ought to be prepared to sell standard types of body.

Mr. Scragg also strongly urged bus manufacturers to work together in questions of regulation, citing cases where a manufacturer had opposed a change in a regulation which would admit a competitor's product to operate in a state. For the good of the industry, said Mr. Scragg, all should be back of movements to obtain regulations that would admit regular types of body and chassis to all states.

It was brought out that most of the regulations affecting buses were made in the name of safety but without any clear idea of how safety could best be obtained. For instance, one state requires that the door of the bus should open inward to prevent passengers from falling out and an equally illustrious commonwealth immediately adjoining says that all doors must open outwards so that fares can get out quickly.

New Jersey says that buses must be not less than 84 in. wide and Florida says they must not be more than 84 in. wide. As most buses are now 90 or 92 in. wide, special jobs must be built for Florida service and these, if on the safe side of the maximum dimensions, would run the risk of being barred from New Jersey.

A tendency to restrict width was noted, and this was urged as one of the strongest reasons for unified action. It was held that a set of regulations approved by all the elements interested in bus manufacture, operation and use would carry a great deal of weight with state commissions, and once a few had accepted the code the others would fall in line. The precedent of the work of the Motor Vehicle Conference Committee in extending the application of uniform vehicle laws was cited.

It was proposed to invite to serve on the committee which will consider the preliminary draft of regulations not only the associations of the automotive industry, but also the users of bodies such as the American Automobile Association, the American Electric Railway Association, the American Railway Association and representatives of highway associations and utility commissions.

Those at the Detroit meeting who drafted the preliminary specifications, using the Society of Automotive Engineers' specifications as a basis, were A. J. Scaife, White; W. C. Parker, Reo; R. S. Burnett, S.A.E.; A. H. Ferlandou, Graham, and Mr. Scragg. This committee will continue its work.

The group also heard a paper by Mr. Parker urging more attention to the proper servicing of buses by fleet owners. It was declared that electric and steam railway users of buses are astonishingly negligent in the matter of preparing for adequate servicing and for the proper choice and training of drivers in the interests of low maintenance costs.

Windsor T. White, of the White Co., presided at the meeting. Among others present were H. V. Loveland, Studebaker; Walter J. Baumgartner, Garford; W. R. Gordon and S. W. Mills, Pierce-Arrow; H. J. Cupper, General Motors; F. A. Whitten and Paul Weeks, American Car & Foundry Motors; B. J. Lemon, U. S. Rubber; James L. Yarnan, Service; A. S. More, Selden; R. J. Goldie, Rugles, and Alfred Reeves and E. F. Loomis, National Automobile Chamber of Commerce.

Specifications Recommended

The recommended specifications to be considered by a special committee before they are submitted to the various state automotive regulating bodies stand as follows:

Length—Maximum overall 30 ft., or the length to be permitted to run as long as that allowed for other public vehicles.

Width—Maximum overall 96 in., or the width to be permitted to be as wide as that allowed for other public vehicles.

Headroom—For intercity types, minimum 75 in. Parlor car buses, minimum 60 in. Sedan types, 56 in. minimum.

Overall Height—A maximum of 16 ft. The foregoing items are not covered in the S.A.E. motor-

coach recommendations but coincide with the "Governmental Restrictions," except the height overall, which is 12 ft. 6 in., and the headroom specifications, which are not mentioned. Others following more or less the S.A.E. specifications follow:

Doors—24 in. width minimum as suggested by S.A.E. The method of opening and location of hinges, etc., will be considered by the committee for insertion in regulations.

Emergency Doors—Location should be either on left side or at rear and have a clear width of 18 in. The matter of lock type and arrangement to be discussed by committee.

Handles—When provided they should be located on the inside to assist passengers in entering or leaving the bus.

Ventilators—Of suitable type to provide proper ventilation as specified by S.A.E.

Heaters—In addition to an adequate heating system as specified by S.A.E., protectors should be provided to prevent inflammable materials coming in contact with heaters or piping.

Fuel Tanks—When tank is located inside body it shall be filled, drained and vented from outside as specified by S.A.E.

Mirrors—An inside rear view mirror must be provided.

Inside Lights—S.A.E. specifications of at least 5 rated c.p. per seat passenger capacity.

Wiring—The general principle recommended by S.A.E. to be adopted with certain modifications by committee.

Passenger Signal System—S.A.E. specifications.

Stop Light—This must be placed so as to be protected from possible damage. One at least required.

Tail Light—Specifications for stop light apply.

Destination Lights—Must be visible 70 ft. in front. One light on each side of bus. Must not be red. It is urged that the colors indicate the destination of bus. Visibility distance of route signs and modifications in visibility of lights to be decided by S.A.E.

Body Overhang—The maximum overhang beyond center line of rear axle must not be more than 7/24 of overall chassis length as adopted by S.A.E.

Height of Floor—Maximum height at door entrance shall be a maximum of 35 in. as specified by S.A.E.

Brakes—Two independently operated sets of brakes shall be provided.

Exhaust—Arrangement specified by S.A.E.

Marker Lights—One special light on extreme left of bus must be provided. Other arrangements and color combinations being decided by special committee.

Speed. Number of Standees—These two questions are to be studied by the special committee with view of setting a regulation.

Improvement in Apparatus for Studying High Speed

VARIOUS methods are in use for lighting up or exposing to view the parts of a high speed mechanism in such a manner that they appear to be stationary or moving at a much reduced rate of speed. Among these is the method making use of a Geissler vacuum tube which is lighted up by sparks from an induction coil operated by an interrupter controlled by the motion of the part to be studied.

One difficulty with this method in the past has been the deficiency of the illumination, which made it necessary to operate in semi-darkness and rendered it quite impossible to illuminate machines of any size. This defect is due to the interrupter, which is required to synchronize the flashes of the vacuum tube with the frequency of the object to be studied. The current which lights up the tube passes through the synchronizer, and its intensity is limited by the arc which is produced at the interrupter; if this arc is very strong the synchronization will be inexact, and, besides, the contact points will wear away rapidly.

A new stroboscopic apparatus has been developed in France which does away with these limitations and makes it possible to illuminate the parts to be studied with as high an intensity as desired. A note on this new method by Laurent and Augustin Seguin was presented to the French Academy of Sciences by Georges Claude some time ago.

In this new device the functions of the synchronizer and of the illuminator have been completely separated. The illuminator is made subject to the control of the synchronizer, which determines the instant of illumination without the lighting current passing through it. In order that the synchronizer may light up the tube exactly at a predetermined moment, the method of lighting up the tube by breaking a current-carrying circuit had to be given up.

A rotary or alternating contact maker produces the discharge of a condenser of low capacity, charged at several hundred volts, through the primary coil of a high frequency transformer, with a smaller number of turns and without iron core. This transformer multiplies the voltage sufficiently to enable it to light up the tube. This dis-

charge, however, lights the tube only very feebly, on account of the small capacity of the condenser, and serves only to prime that of the real source of lighting current.

This current source consists of a powerful battery of condensers which is kept constantly under charge from alternating service mains, the voltage of which is suitably stepped up by transformers and rectified by vacuum tube rectifiers or electric valves.

The source of illumination consists of a tube in which the atmosphere is rarified, preferably a so-called neon lamp, because of its high luminous intensity. This lamp or tube is connected into the discharge circuit of the battery of condensers through the intermediary of a discharge contact controlled from a distance in such a way that no discharge takes place without a priming discharge but that it passes and illuminates the tube as soon as the priming is affected by the synchronizer.

This arrangement permits of an illumination of unlimited intensity, since the intensity depends only on the source of the current and the current does not have to pass through the synchronizer. Moreover, there is no self-induction in the circuit and the lamp therefore lights up practically instantaneously. In fact, on a disk turning at a speed of 100 m. (328 ft.) per second, two lines 1 mm. (0.040 in.) apart could be clearly distinguished.

The high luminous power of this apparatus permits of making observations in full daylight, which is sometimes necessary; observations on objects at a considerable distance, difficult to get close to, or objects of large dimensions, as in the case of a study of the vibrations in turbines or of the frames of machines.

The energy accumulated between two successive flashes and which is dissipated during a very brief time at the moment of the principal discharge, produces an illumination of such high intensity that this particular application of lighting tubes may be considered for marine and aerial searchlights, thus adding to the concentration in space of the luminous rays realized by Fresnel by means of his optical system, a time-concentration of the luminous energy. In that application, the luminous source, formed by the tube, having material dimensions, may be made to conform to the shape of the lense or the reflector.

High-Grade Anti-Knock Fuel Produced by Vapor-Phase Cracking

Crude oil molecules are demolished while in vapor form and product thus obtained has higher percentages of olefines, naphthenes and aromatics.

VAPOR-PHASE cracking of petroleum oils—that is carrying out the demolishing process with the molecules in vapor rather than as liquids—produces gasoline much superior to liquid phase fuels in anti-knock properties and is regarded as the method to be used in the future by W. G. Leaman, Chief Engineer, Stellar Refining Co. In a paper delivered before the Washington Section of the S.A.E. recently he said that Stellarine, the product of his company which is produced by vapor-phase cracking, has usually been found to be equivalent in anti-knock properties to a blend of paraffin-gasoline and 90 per cent benzol containing from 30 to 40 per cent benzol.

An abstract of his paper follows:

The cracking operations that have become of commercial importance up to the present time have been justified and their right to exist has been measured in terms of the quantity demand for motor fuel. They are all liquid-phase processes, that is, the oils of large molecules are heated under conditions whereby these molecules, supposedly in liquid phase, are shattered or broken up into smaller molecules, the maximum possible percentage of the fragments being made of appropriate size for use as fuel in automobile engines.

I believe, however, that the cracking process of the future will be vapor-phase, that is, the demolishing operation will be carried on with the molecules in vapor rather than liquid phase. This is because your latest and wisest demand is for quality, commonly thought of as "anti-knock" fuels, and the vapor phase product is far superior in anti-knock properties.

Paraffin Molecules Predominate

The predominant family of gasoline size molecules found in crude oils is the paraffin. Certain crudes, especially certain California crudes and Borneo crude, contain sufficient amounts of naphthenes and aromatics markedly to improve the quality, or "anti-knock" value, of the gasoline produced therefrom. The product of liquid phase cracking contains varying amounts of olefines, naphthenes and aromatics, especially olefines. The amounts, however, were not sufficient in any samples I have ever examined to equal the natural distillate of equivalent boiling range from the better grades of California crude.

The product of vapor-phase cracking contains very much higher percentages of olefines, naphthenes and aromatics, giving it, consequently higher anti-knock value. The vapor-phase product, properly made, exceeds the California distillates in anti-knock value. The vapor-phase product in which I am interested is one in which the breaking up of the large molecules occurs in vapor-phase and in the presence of a catalyst. It consists

almost entirely of the two series, olefine and naphthene, and bears the name Stellarene.

In the early days of the industry the gasoline market was limited to cleaning fluids and the bulk of it was burned or "accidentally" lost down the river. The real market that supported the industry was kerosene, or burning oil, for illuminating uses. A limited market was worked up for a somewhat heavier distillate for spraying into the coal gas retorts or producer gas retorts for enriching. This gave rise to the term "gas oil" which is still applied to that portion of the crude oil too heavy to use in wick lamps and not viscous enough for lubricating purposes. The heaviest of the oil was, like the gasoline, an abomination to be disposed of.

Kerosene Still Big Factor

The advent of the automobile is responsible for gasoline becoming the mainstay of the refining industry, while the use of electric lights has greatly curtailed the market for both kerosene and gas oil. Over 80 per cent of the world's population, however, is still illuminated with kerosene oil. It has a further important use as fuel for tractors and its market, therefore, is still sufficient to sustain, with reasonable profit, the kerosene producing operations in the refinery. The gas oil and fuel oil portions of the crude, however, are usually handled at a loss. Even lubricants can only be made profitably in large and expensively equipped plants.

Economically, therefore, a process which could convert these unprofitable portions of the crude into gasoline would be able to bear a heavy expense if attended with only a moderate degree of success. These were, therefore, the raw materials about which all the present day cracking processes have been developed.

In making Stellarine all oil returned by the selector, that is the fractionating column, for re-processing, as well as all heavy oils intermediately condensed, together with the fresh cracker stock, are mingled in the so-called reflux tank. The pump takes the oil from this tank and forces it through the economizing units, that is, heat exchanges, to the lower heating coils of the heating element. At a predetermined temperature the mixture of oil and vapors are passed out of the heater into the so-called tar drum. Accurate control of this temperature is effected by means of a pyrometric controller connected to a solenoid valve on a by-pass around the heat exchangers.

In the tar drum the tars and extremely heavy oils, which could not be converted into vapors, are dropped out and allowed to escape through a solenoid valve on the escape line which is operated by a constant level float regulator. The vapors pass back into the heating element where they are raised to as high a temperature as is possible without carbonizing the tubes of the heater.

Where a uniform cracker stock is used, this temperature can be determined experimentally and maintained by a constant temperature pyrometric control connected to a solenoid valve on the fuel line to the furnace of the heating element. Where the characteristics of the cracker stock vary, a different system is used.

The vapors pass from the heater through the reacting zone containing the catalyst, thence to heat exchangers and fractionating column where all but the desired converted product and the gases are condensed and trapped back into the starting tank. The vapors leaving the fractionating column are condensed in the condenser and flow to storage. The percentage of motor fuel in this condensate can be controlled at will but usually is desired to be between 70 and 90 per cent.

Put Through Separator

The gases not condensed in this condenser pass through a separator to take out the mechanically carried mist of liquid and then through a venturi tube and thence to a tail gas recovery plant, where the last remaining portion of gasoline vapors are removed. This fixed gas then returns and constitutes the fuel used by the unit. The differential pressure produced by the passage of the gas through the venturi tube is employed to control the amount of fuel passing to the furnace. By maintaining a constant flow of gas the cracking reaction is maintained at a constant rate regardless of the character of the cracking stock, and the human element in determining correct heater temperature and maintaining it has been eliminated.

It has become an established practice to define the anti-knock value of a fuel in terms of the percentage of benzol necessary to be added to a standard gasoline in order to make the blend produce as nearly as possible the same amount of knock in a motor. Obviously, the composition of the standard gasoline and the purity of the benzol are controlling factors and account for some of the discrepancies often observed in the work of different laboratories. Also it has been found that the performance of a fuel in an engine running under conditions of established detonation, that is a continuous knock, is different from its performance when the engine is running out of detonation, that is without knocking.

Therefore a fuel may, and in fact, does have in some cases, two benzol equivalent values. Stellarene is such a fuel. Further, it is to be noted that increasing amounts of benzol in the reference blend have an increasing anti-knock effect. This is the reverse of the usual effects of the so-called "dopes."

Has a High Fuel Value

Stellarene has usually been found to be equivalent to a blend of paraffin-gasoline and 90 per cent benzol, containing from 30 to 40 per cent benzol. Some determinations of the benzol equivalent of Stellarene, when running at the highest possible compression, before inducing regular detonation, having shown a higher than 40 per cent equivalent. This is the condition that will ordinarily be found in automobile practice. Other determinations have been made showing the benzol equivalent, under conditions in which regular detonation exists in the motor, of less than 3 per cent. Generally speaking, and I believe for all practical purposes, so far as automotive use is concerned, Stellarene may be safely considered as equivalent to an ordinary gasoline benzol blend containing 35 per cent benzol.

A great deal has been said of late about the value of anti-knock fuels and many prophecies have been uttered. But I am not expecting the oft referred to "new motor"

of greatly increased economy and efficiency due to greatly increased compression ratio.

I believe the present automobile motor is already over-compressed to a point where the present proposed fuels can only meet present requirements. The average automobile of today, will show an increase in mileage of 20 per cent when supplied with a fuel of adequate anti-knock properties. This is sufficient economically and mathematically to justify a premium of 20 per cent which my experience tells me to be just about the psychological limit.

But it is not the reason for the popularity of anti-knock fuels. Experience again has convinced me that people pay premiums for automobile fuel because of the greater satisfaction they get from driving a motor which, to use the customary explanations given by the laymen, "runs smoother," "doesn't knock," "runs quieter," "accelerates quicker."

Small Taxicabs in London

POLICE authorities in London have issued new regulations concerning the dimensions of taxicabs that will be licensed under the recently issued order permitting the use of a two-seated type at a fare of nine pence per mile instead of one shilling per mile in the case of four-seaters.

The new dimensions, with those applying to four-seaters, are as follows:

	Four-seater Cabs in.	Two-seater Cabs in.
Clearance (minimum)	10	8
Distance between outsides of:		
Rear springs (minimum)	40	36
Front springs (minimum)	26	22
Wheel track (minimum)	52	48
	mm.	m.m.
Diameter of tires (minimum)	810	760

The maximum overall length must not exceed 168 in. and the width 69 in.

An important new condition refers to freedom from skidding, for if it be found that a vehicle is apt to skid (which is defined as "moving improperly and independently of the steering") the Commissioner reserves the right to serve a "not to use" notice on the proprietor and may refuse to license the vehicle again until the defects are remedied.

Existing cab proprietors are opposing the two-seater cab and their organization is advising its members under no circumstances or terms to purchase or drive them.

THE Hungarian import duties have been lifted on the following items: Asbestos brake bands, steering wheels, bars, castings, and ready-made articles of electron and duralumin for automobile factories, and piston rings. By the same decree existing import duties were reduced 10 per cent on high-speed motors weighing 50 kilos or less each, for motorcycle factories, electrical ignition, starting, and lighting equipment without storage batteries and lamps for automobiles, for automobile factories.

A COPY has been received of a pamphlet entitled "*Deformazioni Statiche Dei Pneumatici, Dei Semi-pneumatici E Delle Gomme Piene*" (Static Deformation of Pneumatic, Semi-pneumatic and Solid Rubber Tires), by Ing.-Dott. Raffaele Ariano of the Engineering Laboratory of the Pirelli Tire Company. The pamphlet is published by the Societa Editrice "Unitas," Viale Piave N. 12, Milan, Italy.

Japanese Market is Improving After 1925 Slump

First quarter exports of automobiles from U.S. to Japan show 100 per cent gain over last year. Country is more prosperous. High taxes hinder sales.

By Robert L. Cusick

THERE is a possibility that American automotive manufacturers will succeed this year in getting their trade with Japan back to the relatively high levels which prevailed prior to 1925.

In 1923 and 1924 Japan was one of the best export markets for American motor vehicles. In 1923, in fact, it absorbed more American trucks than any other country, standing well ahead of our next best customer, which was Australia. The peak of its passenger car trade was registered in 1924 when it ranked eleventh on the list of America's most important customers with imports of 4147 cars valued at \$2,761,568.

Then in 1925 a slump occurred and passenger car exports from U. S. factories dropped to 1095 units valued at \$1,144,143, and truck shipments almost disappeared, totaling only 67 units as compared to 5111 during 1923.

The drastic curtailment of purchases by the Japanese in 1925 is attributed to three factors:

- (a) General business depression;
- (b) A very unfavorable rate of exchange; and
- (c) Public and private propaganda against the use of any "luxuries," particularly imported ones.

But changes in the situation have occurred during the last several months which make the outlook for 1926 more encouraging. According to information just obtained from Frazar & Co., well-known importers and exporters with wide interests in Japan and all other sections of the Far East, sounder business conditions now exist and the recent almost spectacular rise in the value of the yen (par 49.8c) has greatly increased the purchasing power of the country. During the latter part of 1924 and most of 1925 the exchange value of the yen was around 40c, but at present it is about 46.5, or a little more than three cents below par.

Urge for Modern Transportation

The propaganda against "luxuries"—and it must be conceded that this term is rather appropriately applied at present to motor vehicles in Japan, considering the exorbitant taxes which are levied against them—is not expected to stand up against a return of prosperity and the natural urge of the Japanese people, both as individuals and as corporations, for motor transportation.



Street scene in Tokio, where it costs \$394 a year for taxes on a 20 hp. passenger car. The taxes are higher than any place else in the world.

The Japanese are modern and progressive and they realize the economic advantages of the automobile.

Business in Japan during the first quarter of the year was very satisfactory from the automotive standpoint. Writing of developments during this period, Assistant Trade Commissioner Robert J. Phillips in a report to the U. S. Bureau of Foreign and Domestic Commerce said:

"Conditions thus far augur well for 1926 to be a record year in Japanese imports of automotive vehicles. February, which is considered by local dealers to be the worst month of the year, produced a very satisfactory number of sales.

Four-Door Sedan Popular

"The sale of cars ranging within the yen 4000 and yen 6000 class is reported to be steady. The present market feature is the popularity of the American four-door sedan. Coaches, on the other hand, have practically no demand due to the general unsuitability of the two-door type for a chauffeur driven vehicle. With the gradual development of the owner-driver idea in Japan, however, it is believed that this condition will change appreciably within the next few years.

"Stocks of passenger cars on hand are moderate. The only foreign competitor in this market is the Citroen, and while the competition offered by this company is not particularly strong, the new all-steel car which it is now producing is being very widely advertised throughout Japan.

"The truck market, although still continuing with the dullness which has characterized it during the past eighteen months, appears to offer better prospects at this time than at any time since June, 1924. The stocks of old trucks imported during the period of temporary duty exemption immediately following the earthquake have been practically absorbed, and dealers are now on the alert for any new business which it is expected will develop as a result of the extensive building and construction operations planned for the coming year."

A less optimistic view is expressed, however, in a later report to the Bureau from Acting Commercial Attache A. B. Calder, of Tokio. He stated that some of the

favorable developments anticipated at the first of the year have failed to materialize and mentioned particularly the decline in raw silk prices due to a slackening of American demand. He also reported further activity toward popularizing home products and encouraging home industry as indicated by the formation in Yokohama and Osaka of an organization similar to the national products encouragement associations previously formed in Tokio. The Department of Commerce and Industry also appointed a committee recently to study Japanese industry and boost the sales of Japanese products.

Own Industry Negligible

These movements to discourage the use of foreign products must be given due consideration by American automotive manufacturers, but it should be remembered that the domestic manufacture of motor vehicles is negligible and if the Japanese people want automobiles they will have to go outside their own country to get them. "Home products" campaigns therefore will probably have little effect on the sales of American cars.

During the first three months of 1926 exports of American passenger car to Japan ran substantially 100 per cent ahead of the figures for the corresponding period of 1925, both in volume and value. The truck market remained practically negligible during January and February, but in March there was an indication of renewed activity. In that month 17 units were shipped, or almost 25 per cent of the total number exported to Japan during the previous year. The comparative figures for the first quarter of 1925 and 1926 follow:

U. S. Exports to Japan, First Quarter of 1925 and Same Period of 1926

<i>Passenger Cars</i>				
	1925		1926	
Month	No.	Value	No.	Value
January	69	\$57,629	133	\$133,813
February	36	43,929	110	97,605
March	80	78,824	166	148,502
Total	185	\$180,382	409	\$379,920

<i>Trucks</i>				
	1925		1926	
Month	No.	Value	No.	Value
January	4	\$16,021	1	\$1,289
February	4	1,820	1	8,657
March	1	600	17	14,276
Total	6	\$18,441	19	\$24,222

Other tables accompanying this article show the volume and value of passenger cars, trucks, parts, and tires and tubes exported to Japan during recent years. It is interesting to note that a sizeable market has been developed for parts and tires, and that the shrinkage of the passenger car and truck business in 1925 did not affect the sale of these other items.

All the automobiles that have been sold in Japan up to this time have been sold in the face of three unfavorable factors, any one of which would be detrimental to the development of broad automobile market in any country. These are:

- Excessive taxation, especially in Tokio.
- Narrow, unimproved roads.
- The "chauffeur habit."

The "chauffeur habit" or custom is a psychological factor that has retarded sales in this market and it must be broken down before the use of automobiles becomes very general. The Japanese endowed with sufficient means to own a passenger car believes that when he buys

U. S. Exports to Japan, 1922-1925

<i>Passenger Cars</i>		
Year	No.	Value
1922	1,271	\$783,291
1923	3,734	2,104,521
1924	4,147	2,761,568
1925	1,095	1,144,143

<i>Trucks</i>		
Year	No.	Value
1923	5,111	\$3,097,570
1924	3,053	1,769,244
1925	67	93,427

a car he must also hire a chauffeur and unless he can afford the one he does without the other. Owner driving, once accepted as an operation in keeping with the dignity of a Japanese gentleman, will bring thousands of new buyers into the market. Sales of low or medium-priced cars especially will increase, as it will be unnecessary then to buy expensive models with separate driving compartments.

U. S. Exports of Parts to Japan 1922-1925

Year	Value
1922	\$456,386
1923	1,257,388
1924	1,149,024
1925	1,840,389

<i>Tires and Tubes</i>	
Year	Value
1923	\$758,842
1924	1,004,523
1925	1,086,702

Better roads will stimulate motor transportation in Japan just as they have popularized this form of travel in other parts of the world, and there are indications that the Empire is alive to the need for development in this direction. The budget of the Province of Taiwan, for example, now contains an item of \$6,000,000 for preliminary work in the construction of a great principal highway 287 miles long which will extend from one end of the island to the other. The road will be 48 feet wide except in the mountains, where a 36 foot minimum will be allowed.

Japan has modern and efficient railway systems (many of the lines have been electrified) and it is reasonable to assume that in time she will build up a system of highways adapted to the requirements of automobile traffic.

Taxation is an extremely serious question for the Japanese who aspires to the ownership of a car. If he

Canadian Exports to Japan, 1923-1925

<i>Passenger Cars</i>		
Year	No.	Value
1923	260	\$166,714
1924	382	195,009
1925	557	340,392

<i>Trucks</i>		
Year	No.	Value
1923	80	\$37,478
1924	151	70,575
1925

British Exports to Japan, 1923-1925

Passenger Cars

Year	No.	Value
1923	58	£20,622
1924	213	51,665
1925	87	15,801

Trucks

Year	No.	Value
1923	27	£8,767
1924	24	14,162
1925*	9	6,227

* 11 Months

French Exports to Japan, 1923-1925

Year	Passenger Cars	Trucks
1923	320	2
1924	317	7
1925*	251	4

* 11 Months

happens to live in Tokio he is compelled to pay a rate that is the highest in the world. The tax there is based on horsepower and there are municipal, prefectural and city taxes which together mount up to an appalling total as compared to standards in other countries, especially in the United States. The British tax of £1 per horsepower is considered high but the annual rate in Tokio on a passenger car of 20 rated horsepower is about \$19.50 per horsepower, or \$394. With one or two exceptions, all cars built in the United States are rated at 20 or more horsepower and therefore the Japanese who buys an American car, as most of them do, will in certain cases pay for the privilege of operating it an annual tax equal to the retail market price. The following table shows the Tokio tax rate for passenger cars and trucks of various classes. Taxicabs, buses and cars for hire pay the passenger car rates.

	Prefectural Tax	City Tax	Special Tax	Total
Passenger Cars				
Less than 5 hp.	\$22	\$42	\$5.50	\$69.50
5 to 10 hp.	39.50	73	9.50	122
10 to 15 hp.	65.50	120.50	16	202
15 to 20 hp.	100	182	25	307
20 hp. and over	127.50	234.50	32	394
Commercial Vehicles				
Less than 5 hp.	\$12	\$22.50	\$3	\$37.50
5 to 10 hp.	20	37	5	62
10 to 15 hp.	30	55	7.50	92.50
15 to 20 hp.	43	78	10.50	131.50
20 hp. and over	60	110	15	185

These high rates explain to a large extent why in Tokio, a city of more than 2,000,000 population, there are less than 10,000 passenger cars, including buses and taxicabs, and less than 2000 trucks.

In the other cities of Japan, however, taxes are considerably lower than those listed above, ranging usually from \$50 per year for a two-passenger car to \$100 for a seven-passenger car, according to the Bureau of Foreign and Domestic Commerce.

The import duty on American motor vehicles in Japan is 35 per cent ad valorem and 25 per cent on parts.

A DEFINITE step toward the formation of an international body to develop and perfect industrial standards took place a short time ago when representatives of 17 national standardizing bodies met with the United States representatives to discuss the subject. A general favorable attitude toward international standardization was expressed by many of the delegates who appreciated the value of the work already done along this line by the

International Electrotechnical Commission and the results of international cooperation in standardizing ball bearings, the harmonizing of American and British screw thread standards upon which interchange of bolts, nuts and other threaded parts depend, unifying specifications for zinc and the standardization of gaging methods and limits and fits necessary to interchangeable manufacture and mass production generally.

The conference was called by the American Engineering Standards Committee and was attended by representatives of 18 of the existing 20 national standardization bodies which are similar in purpose to the A.E.S.C.

Used Wrong Standards

Technical discussions at the conference concerned standardization of bolts and nuts and screw threads. Soon after the war the Germans adopted national standards for bolts and nuts and corresponding wrench openings and were followed by similar action in Austria, Holland, Sweden and Switzerland. In adopting their present standards the Continental countries thought they were closely following American practice but in fact their standards were patterned after the so-called United States Standard which is used but little in this country at present.

The standards proposed by the American delegates are based on the present practices in the automotive and agricultural implement industries where the suggested sizes have had long practical use and have given satisfaction. Sir Richard Glazebrook, an English delegate, stated that his organization was investigating the possibilities of using much smaller nut and bolt heads to reduce cost and the conference requested the British Engineering Standards Association to continue the experiments, the results of which will be circulated to the various national bodies.

In the matter of harmonizing the British and American screw thread standards, the suggestion was made that a screw having an angle of thread of 57½ degrees—just midway between that of the British and the American standards—be adopted. It was said that this new thread would be practically interchangeable with products threaded in accordance with the present national standards. In other words there would be no difficulty in mating a bolt threaded in the new way with a nut either of the British or American system.

No definite action was taken on this proposal but the suggestion is to be circulated among the 20 national standardization bodies for their consideration and possible future action.

New Russian Patent Law

A NEW patent law has been adopted in Russia, according to which patents for inventions can be taken out in that country by Russian citizens and foreigners alike. After the revolution all patents were suspended and the inventions declared public property controlled by the Government, and with the new law the principle of private property is recognized once more in Russia. The new law is based on the German and American patent laws. Applications are examined as to novelty and practicability. Objections to the granting of a patent are permitted, and appeals can be made from the decision of the examiner. Applications must be made in the name of the actual inventor or his legal representative, and patents are granted for a period of 15 years. A patent must be worked within 5 years from the date of issue, else it is invalidated. However, extensions of 5 years are granted on both the life of the patent and the period in which it must be practically applied, if the patentee can submit sound reasons for delay in exploiting the patent. Payment of fees begins only with the working of the patent.

A Railroad Man Discusses Motor Transportation

Railroads must recognize that public necessity requires development of commercial transport on highways, says Ralph Budd, of the Great Northern.

THE railroads of the country must recognize that public necessity and convenience require the development of commercial transportation upon the highways. They should not attempt by arbitrary means to eliminate motor vehicle competition and should only insist that such competition be subject to proper public control. Further, they should seriously consider whether or not this new form of transportation, from the public as well as from their own point of view, cannot be more advantageously conducted under railroad management than otherwise.

These views were expressed by a practical railroad man, Ralph Budd, president of the Great Northern, in a paper on "The Relation of Highway Transportation to the Railway," delivered before the American Society of Civil Engineers at Kansas City, Mo., April 14.

Mr. Budd said that in certain particulars and under certain conditions motor trucks and buses render services which the railroads cannot duplicate. He doesn't feel that either has made any appreciable inroads on the rail business. Contrary to popular opinion, he says it is the privately-owned passenger car and not the bus that has reduced railway passenger traffic.

Favors Federal Regulation

He favors Federal regulation of motor vehicle common carriers in interstate service, but sees it as a benefit rather than a handicap to "legitimate common carrier operators" on the highways. He doesn't believe that motor transport lines should be permitted to operate "when essential carriers" (existing rail lines) "are able to give service that is measurably similar to that proposed, or when the success or efficiency of the existing essential carrier would be seriously impaired without definite and distinct improvement in service to the public."

His paper, in part, follows:

Probably the questions most commonly asked by railroad men concerning the motor bus, are "What can its attraction be?" and "Is it not a fad which soon will lose its novelty and disappear?" In many localities the bus does have some advantages over the railway train for local travel. Two of these are the greater frequency and flexibility of its service. Compared with the railroad train, the bus can give service at more frequent intervals, because each unit of service is small and may be operated

"THE cost of bus operation should be at least 15 per cent less than it is, and unless it is reduced that much the business will not grow to its full possibilities," says Mr. Budd.

"Standardization should result in substantial reduction in first cost and the lessening of obsolescence would reduce the depreciation charges. With lower costs, rates can be reduced and travel increased.

"I believe a good many people living along bus routes will take buses to town instead of driving their own cars, especially if the fare is low enough. It is a logical development in rural transportation for the bus to replace the private car on many occasions."

cheaply in comparison to the expense of operating a train.

The ratio of cost of highway bus to steam train operation is about one to five, which means that for the cost of one train in each direction, say morning and evening, a bus can be run every two hours in each direction from 8:00 A. M. to 4:00 P. M. and this more frequent service better suits the needs of the average rural community.

In connection with these questions of frequency and flexibility of service, which are the main advantages of local highway over local railway passenger service, let us consider whether the railways really lost their business to motor buses or to private automobiles. Statements submitted to the Minnesota Railroad and Warehouse Commission recently, indicate that the railways in Minnesota had lost a substantial part of their local passenger traffic before the motor buses began operating to any extent, and that the number of automobiles steadily increased as the number of passengers carried by railways declined, also that at stations where motor buses have been operating for some time, the loss of passenger business has not been materially greater than at stations where they never have operated. A tabulation of ticket sales at twenty-six stations in Minnesota showed that at fifteen of these, where there was no bus competition, the decrease in passenger tickets sold in 1924 compared with 1920 was from 49 per cent to 76 per cent with an average of 64.6 per cent. At eleven others, where there was bus competition, the decrease was from 55 per cent to 74 per cent, with an average of 63.7 per cent. The total number of tickets sold at twenty-six stations in 1920 was 488,649, and in 1924, was 175,706, a decrease of 312,943, or 64.0 per cent.

During these years the total number of passengers handled by the railroads in Minnesota decreased from 18,360,678 to 7,905,378, or 56.9 per cent while passenger train miles on these railroads decreased from 14,667,336 to 14,223,456, or 3 per cent. During the same time, the number of automobiles in the state increased from 324,166 to 503,437, or 55.3 per cent. Motor buses were not a factor until 1921, when there were one hundred. That

number had increased to four hundred or more in 1924.

These and other data point to the conclusion that the private automobile has had a great deal more to do with the loss of railway passenger business in Minnesota than the motor bus. They also suggest, and railway statistics support the suspicion, that before bus operation began, the local passenger traffic of the railways in Minnesota had decreased to a point where much of it was being done at a loss, largely because passenger train miles had not been correspondingly reduced.

The rapid development of the common carrier motor vehicle, especially as applied to the bus, has resulted in the enactment of regulatory measures by most states of the Union.

Regulation a Protection

These regulatory acts are wholesome and necessary. Without such regulation the public had no protection from so-called "fly-by-night" operators, who had no capital and who were unable to furnish adequate service. These irresponsible operators would come and go as the seasonal business might permit. That made it impossible for the legitimate operator to make reasonable profits and maintain adequate service. Sound regulation is building up in the several states of the Union a fixed and dependable service, and one which in coordination with the railroad service in these states, gives to the public the best conceivable local transportation. The rates which the bus companies are permitted to charge in general bear a fair relation to the railroad rates, and are generally only a fraction of a cent per passenger mile less than railroad fares.

The states have no power to deny the operation of interstate carriers and have very little regulatory power over them. Truck and bus operators of the nation engaged in interstate commerce recognize that Federal regulation sooner or later is inevitable. But the Federal government, in regulating the interstate motor carriers, should leave that regulation, so far as the Constitution will permit, to the Commissions of the interested states.

About 75 per cent of the railroad business is interstate, and, therefore, the regulatory power of the railroads is properly vested in the Federal government. The truck and bus business, by its nature always will remain largely a local problem. Speaking in general terms, perhaps as much as 90 per cent of the truck and bus transportation of the country will always be intrastate. Those vehicles travel highways which were built by the state, and are policed and maintained by the state. It is, therefore, most proper that the power that regulates be delegated to the several states as far as practicable.

The Bill in Congress

The Congress has now under consideration a bill regulating interstate motor vehicle transportation. The bill as drawn is intended not to hinder or hamper the development of common carrier transportation upon the highways, but will protect the legitimate operator thereon. It recognizes as a fundamental principle that common carrier transportation service must be in the hands of a responsible operator and that such operator should be protected from the irresponsible and casual operator.

Every user of facilities furnished by the state should pay reasonable compensation for the use thereof, especially when such facilities are used for private gain. Common carrier motor vehicles should pay a fair and reasonable tax for the use of the highways, but regulation should not be attempted through taxation. By this, I mean that taxes should not influence the granting of permission to operate, and that they should not be burdensome to the point of preventing low fares.

A highway is constructed for the benefit of society as a whole. Society, in the aggregate, benefits whether or

not each individual may or may not use the highway. It has never been the policy of a state to charge the entire cost of upkeep of the highway to the users thereof. The highways are used by private individuals in the transaction of their private business for profit. They are used also by those who travel for pleasure, and they are used by common carrier transportation companies. Those individuals who choose not to drive their own cars, but to ride in common carrier motor vehicles should not be asked to bear an unfair share of the burden of upkeep of the highways nor should they be deprived of the advantage of cheap transport as inevitably must happen if public motor vehicles are taxed unduly high, resulting in higher fares.

Whether a railway company itself should own and manage buses may depend upon its willingness or unwillingness to take on additional obligations and responsibilities, but if no prejudice exists against bus operation, the deciding question probably will be whether, by such control, wasteful duplication can be eliminated and the service improved. There has been instances where, by coordinating the schedules, bus service has supplemented train service, to the end that for a lesser total expenditure a more complete and satisfactory service has been rendered. Each case is one for individual consideration. In many places throughout the United States electric lines have abandoned all or part of their tracks, and substituted bus service. In other cases, notably in New England, steam roads have replaced branch lines with buses and trucks.

Question of Cost Vital

The question of cost of operating buses is vital for the future of that form of transportation, but reliable records have not been kept long enough to establish what might be called normal costs for certain routes or localities as is the case with transportation cost on the different divisions of railway systems.

But the cost of bus operation should be at least fifteen per cent less than it is, and unless it is reduced that much the business will not grow to its full possibilities.

Standardization should result in substantial reduction in first cost and the lessening of obsolescence would reduce the amortization or depreciation charges. With lower costs, rates can be reduced and travel increased. I believe a good many people living along bus routes will take buses to town instead of driving their own cars, especially if the fare is low enough. Here is an opportunity to render a service to rural communities, and I believe it is a logical development in rural transportation for the bus to replace the private car on many occasions.

There are about 2,500,000 motor trucks in the United States. About 95 per cent of them are non-common carriers, and are not subject to regulation as to rates or service.

The principles governing the regulation and taxation of commercial freight carriers on highways are similar to those governing buses, but the handling of freight is so different from the handling of passengers that the truck bears a different relationship to railroad freight service than the bus does to railroad passenger service.

Common carrier trucks should not be permitted to operate in competition with railways except where there is a real public convenience or necessity. The convenience of a few in obtaining a quick delivery of property should not be controlling. It is most important that regulatory bodies, before granting a certificate for the operation of trucks, should carefully analyze what effect that operation is going to have upon the essential rail carrier. The public cannot maintain two freight transportation agencies without paying for both, and unless each performs a service which the other cannot do economically and efficiently, both should not be supported.

Cars of Three Nations to Race at Indianapolis This Year

Three Schmidt Specials, a Guyot and a Bugatti from France. Two Eldridge Specials from England. 32 American cars entered, one with a two-cycle engine and four of front drive type.

THIRTY-NINE 91½ cu. in. cars—32 American, 5 French and 2 British—have been entered for the Fourteenth Annual International Sweepstakes to be run at the Indianapolis Motor Speedway, Monday, May 31. Of this number, 33 will be permitted under the rules to start the 500-mile run over the two-and-a-half-mile brick and concrete track, the cars to start being decided the week before the race by means of speed trials.

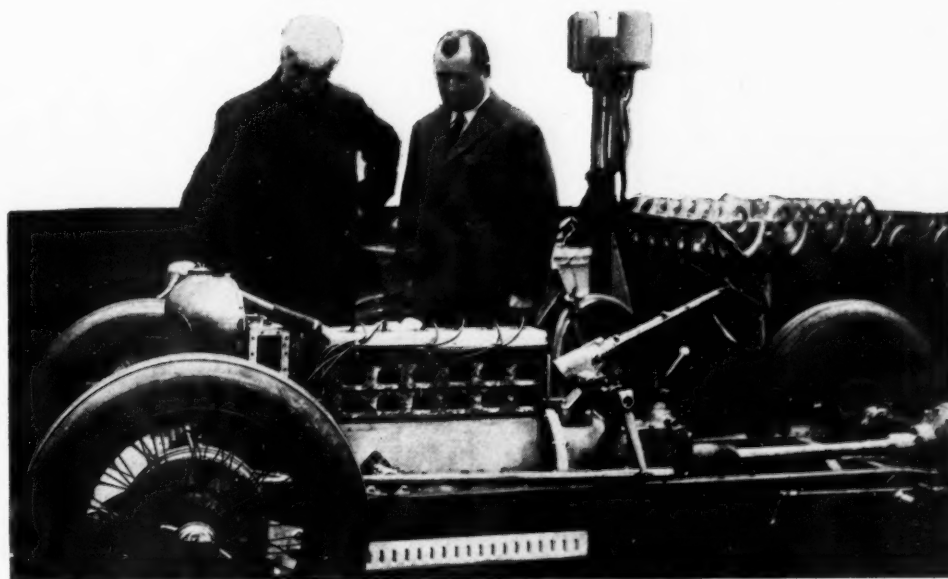
Of the American cars, there are 14 Miller Specials, 2 of them with front drives; 5 Duesenbergs; a Hamlin Special ("Fronty-Ford" front drive type); a Seivers, Jr., Special, said to be a home-made eight; an Abell Special; a Boyle Valve Special; a Green Super-Ford Special; a K. & M. Special; a Shambaugh Special, and six as yet unnamed.

Three of the French cars are Schmidt Specials, one is a Guyot Special, entered by Albert Guyot, the fifth is a Bugatti. The British machines are Eldridge Specials.

One of the unnamed American cars, that entered by F. P. Cramer, who is connected with the Altoona, Pa., motor speedway, is said to be a radical departure from established design in that it is fitted with a two-cycle engine. It is understood that the machine is still under construction in the plant of a leading speed car builder and its actual appearance on the track is not assured. Should it succeed in getting into the race, however, its performance probably will be watched with

closer interest by automotive men than that of any other entry. It is said to be an "eight."

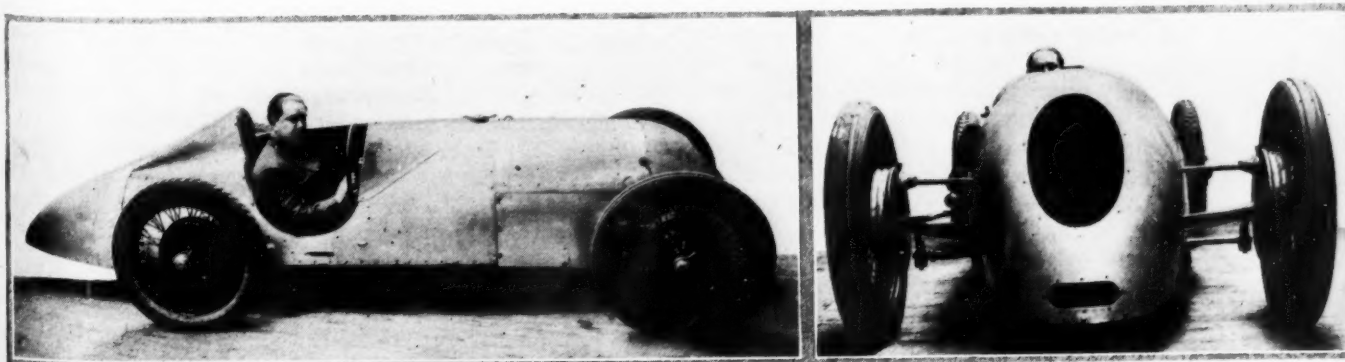
The Abell Special and Boyle Valve Special are of Miller design and the Green Super-Ford uses a Gregg supercharger. The Shambaugh Special is expected to be a four-cylinder, built and driven by Charles Shambaugh, who has had a similar car at Indianapolis in the past but



Albert Schmidt (left) and Albert Guyot inspecting one of the new Schmidt Specials in Guyot's workshop, in Paris. Three of these cars, all fitted with single sleeve valve, six-cylinder engines, will be brought over for the Indianapolis race

failed to qualify. The unnamed car entered by Herbert Jones also has a four-cylinder engine.

The two Eldridge Specials, of British design and entry,



Side and front views of the Eldridge Special with E. A. D. Eldridge at the wheel

Cars and Drivers Entered for Indianapolis Race

CAR	DRIVER	ENTRANT	CAR	DRIVER	ENTRANT
Duesenberg Special	Not Named	Peter DePaolo	*Eldridge Special	E. A. D. Eldridge	E. A. D. Eldridge
Miller Special	Peter DePaolo	Peter DePaolo	*Eldridge Special	W. Douglas Hawkes	E. A. D. Eldridge
Miller Special,			Hamlin Special,		
front drive	Dave Lewis	Harry Miller	front drive	Not Named	Hamlin Motor Co.
Miller Special	Harry Hartz	Harry Hartz	Duesenberg Special	Jack Foley	Jack LeCain
Miller Special	Fred Comer	Harry Hartz	Duesenberg Special	Ben Jones	Ben Jones
Miller Special	Not Named	Harry Hartz	Sievers, Jr., Special	T. W. Pickard	T. W. Pickard
Miller Special	Bennie Hill	Harry Miller	Miller Special	Norman Batten	Norman Batten
Miller Special	Jules Ellingboe	Harry Miller	Abell Special	Thane Houser	Geo. Abell
Unnamed car	Ralph DePalma	Ralph DePalma	Miller Special	R. G. McDougall	R. G. McDougall
Unnamed car	Not Named	Ralph DePalma	Unnamed car	Earl DeVore	F. P. Cramer
Miller Special	Pete Kreis	Pete Kreis	Boyle Valve Special	Cliff Woodbury	Cliff Woodbury
Miller Special	Frank Elliott	Frank Elliott	Green Super-Ford		
Unnamed car	Cliff Durant	Cliff Durant	Special	Not Named	Green Engineering Co.
Unnamed car	Harlan Fengler	Cliff Durant	Miller Special	Dr. E. W. Shattuc	Dr. E. W. Shattuc
Miller Special,			Miller Special	Daniel J. O'Brine	Daniel J. O'Brine
front drive	Earl Cooper	Earl Cooper	K. & M. Special	A. D. Cain	K. & M. Machine Co.
Unnamed car	Herbert Jones	Herbert Jones	Shambaugh Special	Chas. Shambaugh	Chas. Shambaugh
†Schmidt Special	Not Named	Albert Schmidt	Duesenberg Special	Bob McDonough	Tommy Milton
†Schmidt Special	Not Named	Albert Schmidt	Duesenberg Special	Ralph Mulford	Ralph Mulford
†Schmidt Special	Not Named	Albert Schmidt	Bugatti	Not Named	"Bud" Ward
†Guyot Special	Albert Guyot	Albert Guyot			

†French

*English

but built in France especially for the Indianapolis race, are the outcome of experience on Montlhery and Brooklands tracks. While the engines are practically identical, the chassis are entirely different, one of them being a two-seater with the mechanic's seat covered over, and the other being a narrow single seater. Drivers will be E. A. D. Eldridge and Douglas Hawkes, both Englishmen.

Very close attention has been paid to stream lining and to obtaining a low center of gravity, the two seater having a total height of only 31 inches, a perfectly flat under surface and presenting a very unusual appearance. Front and rear axles and springs are mounted above the frame members; the engine is offset to the left in the frame, the differential is out of center, and the driver's seat is below the top of the propeller shaft housing.

Four-Cylinder Engine

On each car Eldridge is making use of a four-cylinder engine of 69 by 100 mm. (2.7 by 3.9 in.) bore and stroke, bringing it just within the piston displacement limit of 91½ cu. in. The cylinders are a single iron casting with a detachable head mounted on an aluminum crankcase. A three bearing built-up crankshaft is made use of, the shaft being in five parts and Hoffman rollers being used for the bearings. The connecting rods are I-section without split ends, also having roller bearings.

The method of driving the two overhead camshafts is somewhat unusual. On the front end of the crankshaft is a spur pinion driving a half time shaft occupying the position of the camshaft in an ordinary L-head engine. On the rear end of this shaft is a sprocket by means of which chain drive is secured for the two overhead camshafts; the chain therefore runs at half engine speed. Adjustment of the chain is provided by an idler sprocket.

The valves, which are at an angle of 90 deg., have screwed on their extremity a small steel piston sliding in a cast iron guide in the cylinder head, and having set in it a hardened roller with which the cam comes in contact. To secure adjustment between cam and valve, the rollers are changed, this being done by removing the pin carrying them in the yoke on the head of the piston. Various sizes of rollers varying by one-tenth of a millimeter up and down from a standard, are kept for adjustment. This device eliminates all side thrust on the valve stems and

even with 100-pound valve springs gives a very easy camshaft drive.

Use is being made of a special type of shrouded valve invented by Harry Ricardo. By means of this the port is not uncovered during the first portion of the movement of the valve, but practically maximum opening is obtained at a given point and the shut off is almost instantaneous.

The cooling water is circulated by a combination of pump and thermo-syphon. The main piping is sufficiently big to allow a thermo-syphon flow, but within this are set copper water pipes of about 10 mm. internal diameter by means of which the water is directed under pressure around the exhaust valve seatings. To further assist cooling, the water is led off from the head at eight different points, one around each valve, and is brought up to the top of the radiator by a couple of outlet pipes. In addition to this there is a shallow header tank under the cowl, the capacity being about one gallon, which serves to keep a head of water on the radiator without increasing the height of the latter. The radiator itself is considerably inclined rearward, so as to help reduce the total height of the car.

Lubrication is under pressure, with a very big supply of oil carried in a reserve tank alongside the driver's seat. The sump is dry, two pumps being used, one for scavenging and the other for feeding the engine, and the lubricant is passed through an oil radiator under the water radiator.

A vertical Roots' blower, driven by skew gearing from the front end of the crankshaft, is made use of in conjunction with a Solex carburetor. For short distance work the blower runs at one and one-third engine speed, but for long distance racing it probably will be run at engine speed. The carburetor is on the forward right hand side of the cylinder block, with its funnel shaped air inlet facing forward through the engine hood, the supercharger sucking through the carburetor and delivering the mixture through a pipe of gradually decreasing section passing under the crankcase to the inlet manifold on the opposite side of the engine.

The exhaust is on the left hand side and is led to the rear by an oval section pipe of very big area attached to the left hand frame member. Unit construction of engine and gearbox has been adopted, the two-seater car having center control with the driver on the right. The steering

column is perfectly horizontal, with the steering gear box practically on the level of the camshaft housing.

A standard type Perrot front axle with Perrot brakes is made use of on both cars. All the brake gear, with the exception of the short lengths of brake camshafts, is enclosed and adjustment of both front and rear set can be carried out from the driver's seat. The single-seater car differs from its companion in being narrower and in having quarter elliptic springs at the rear. Both cars can be presented in racing trim at the minimum weight of 1400 pounds.

It is understood that the Eldridge Specials will run with Dunlop tires, probably with drop center rims.

The French designed and constructed Schmidt Specials are owned by Albert Schmidt, of Hunt Creek, Lewiston, Mich., and are distinctive in having a six-cylinder single sleeve valve engine of the Burt-McCollum type, the world rights for which recently were acquired by the Continental Motors Corp. Schmidt, an elderly patron of racing, had an entry at Indianapolis in 1924 which was flagged after 182 laps with Ora Haibe at the wheel. He also entered in last year's contest but withdrew before the start. The jobs he is entering this year were built in the shops of Albert Guyot, at Paris, and are very similar in design to the Guyot Specials which were entered last year and later withdrawn, and which were described in *Automotive Industries* of April 30, 1925.

The engine has 60.6 by 86 mm. (2.38 x 3.38 in.) bore and stroke, the cylinders being an iron casting mounted on an aluminum crankcase divided horizontally. Under the Burt McCollum patents, a single steel sleeve having a combined reciprocating and helical motion, is made use of. From a racing standpoint the outstanding advantage of this is that it provides practically unlimited area of valve port, and full advantage has been taken of this on the Schmidt Specials by having a normal port on the left hand side and in addition to this a port near the bottom of the piston stroke, which is completely uncovered by the piston. With this engine, having a 60 mm. bore, the exhaust port opening is equivalent to that of a poppet valve of 50 mm. diameter.

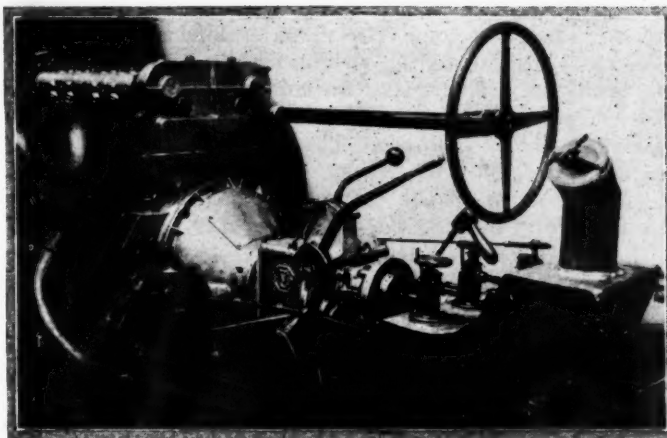
Rods of Tubular Section

A one-piece crankshaft with circular webs is made use of and there is a Hoffman roller bearing between each cylinder. The connecting rods, which are of tubular section, with split ends, also are mounted with Hoffman roller bearings. A horizontal shaft on the right hand side of the crankcase, and driven off the crankshaft by spur gearing, provides independent drive for the eccentricities operating the six sleeves.

Supercharging is by means of a Roots' blower drawing a mixture through a Cozette carburetor. The blower is driven vertically by bevel gearing off the front end of the crankshaft, at a speed of 6000 revolutions for 5000 revolutions of the engine. The mixture is delivered through a horizontal pipe and an elbow containing a pressure relief valve into the straight intake manifold. In addition to the high pressure lubrication system assured by a scavenger and a feed pump, with a supply of oil under the cowl and an oil radiator between the horns of the frame, there is an auxiliary pump driven off an extension of the magneto shaft, by which oil is directed to the sleeve operating mechanism and to the supercharger.

Ignition is by high tension magneto, at the front of the engine, driven from a cross shaft, with a single plug in the center of the cylinder.

The Schmidt Specials have a height of 31 in. to the top of the radiator, the line increasing from this point to the maximum of 39 in. on the top of the gasoline tank. The



Some details of the Eldridge Special. Note the horizontal steering column, oil tank at side of driver's seat and exhaust pipe attached to left side rail

four-wheel Perrot brakes are operated simultaneously. The steering gear column is telescopic, allowing of any length, and can also be adjusted for rake. Fitted with Rudge-Whitworth wheels, the cars doubtless will race with drop center rims.

Guyot's car is expected to be similar in design to the Schmidt Specials, which he helped to build. The French veteran knows all the quirks of the Hoosier course, as he has participated in four previous 500-mile events there. His first appearance was in 1913 when he finished fourth in a Sunbeam. In 1914 he captured third place in a Delage; in 1919 he was fourth in a Ballot, and in 1921 he drove a Duesenberg into sixth position.

The Bugatti, which was entered at the eleventh hour, is owned by "Bud" Ward, of Philadelphia, son of Dr. M. R. Ward, president of the Atlantic City Motor Speedway Association. Little is known about this car beyond the fact that it will probably race without a supercharger. A companion car of larger piston displacement, 122 cu. in., also owned by Ward, was started in the 300-mile race at the Atlantic City speedway on May 1, but was outdistanced by the American cars and dropped out at the end of 18 miles. The driver of the Bugatti has not been announced. Five Bugatti cars raced at Indianapolis in 1923 and one of them took ninth place. The other four failed to finish.

The only car on the ground at Indianapolis at the time this was written was the Seivers, Jr., Special, which was designed and built by A. J. Seivers, a 22-year old mechanic of California, who has worked for several prominent drivers, including Ralph DePalma. This car will be driven by T. W. Pickard, who is an aviator but new to the automobile racing game. The financial backer of this team is a woman, Mrs. L. T. Grace, of New York, Pickard's aunt.

As this will be the first time engine piston displacement has ever been limited to 91½ cu. in. for the Indianapolis race there is all sorts of speculation as to possible speeds.

In the trial test of the first of the new Miller racers with the 91½ cu. in. maximum piston displacement to be completed by the Miller Engine Works in Los Angeles for the Indianapolis races, Benny Hill developed a speed of 130.8 miles per hour at the Culver City race track. Inasmuch as this was the first trial given the new Miller jobs, it can be expected that the 130.8 mark will be considerably exceeded.

The new Miller engines have eight cylinders, displacement of 90.2 cu. in., 154 b.h.p. and 7000 possible r.p.m. The bore is 2 3/16 and the stroke 3 in. There are five

main bearings, two overhead spur gear driven camshafts, and an integrally counterbalanced crankshaft as on the older models. The engine weighs 290 lb., or about 100 lb. less than the last year 122 in. engine of the same make. There are two valves per cylinder, with one spark plug in center of each cylinder. The turbine supercharger in the new cars is built to drive off the crankshaft, as against the former drive off the camshaft.

A feature of the new cars is easier steering, which has been effected with an all-ball bearing steering gear. Another feature is a positive lock for the clutch. Dogs dropping in slots in the flywheel prevent any possibility of clutch slipping when car is racing at high speed.

Duesenbergs Still Under Cover

Little information has been released as yet regarding the Duesenbergs. It is known, however, that the same running gear and bodies as used on last year's 122 cu. in. jobs will be retained and that the engines will have eight supercharged cylinders as heretofore. The approximate bore and stroke is 2 3/16 by 3 in. The new engines will turn up much faster than any of previous Duesenberg design and the builder is of the opinion that this year's speeds will not suffer in comparison with the 1925 record.

The Hamlin Special, entered by the Hamlin Motor Car Co., has been built in the plant of Arthur Chevrolet and is a modified Ford with patented Hamlin front drive universals. Ford parts will be used extensively throughout. The engine will be a 16-valve Fronty-Ford type of 2 7/8 in. bore by 3 1/2 in. stroke. With a supercharger the engine is expected to turn up to 6000 r.p.m. Ford transmission and rear wheel brakes will be employed. Double front axles of the tubular type are bent forward at the center to accommodate the central universal, from which drive shafts interposed between the upper and lower tubes will transmit the drive to the front wheels.

In view of the close watch that is being kept this year on the performance of the 191 1/2 cu. in. cars, statistics relating to maximum piston displacements and winning speeds of previous Indianapolis races may be of interest:

Year	Maximum Displacement	Winning Speed
1911	600 cu. in.	74.59 m.p.h.
1912	600 cu. in.	78.7 m.p.h.
1913	450 cu. in.	76.92 m.p.h.
1914	450 cu. in.	82.47 m.p.h.
1915	300 cu. in.	89.84 m.p.h.
1916	300 cu. in.	83.26 m.p.h.
1919	300 cu. in.	88.06 m.p.h.
1920	183 cu. in.	88.50 m.p.h.
1921	183 cu. in.	89.62 m.p.h.
1922	183 cu. in.	94.48 m.p.h.
1923	122 cu. in.	90.95 m.p.h.
1924	122 cu. in.	98.23 m.p.h.
1925	122 cu. in.	101.13 m.p.h.

Pete DePaolo, who won the race last year and set the new record of 101.13 m.p.h. in a Duesenberg, will be at the wheel of a Miller Special this time, but he has entered his Duesenberg and will engage another driver, as yet unnamed, to pilot it.

B. of S. Research Associates

CIRCULAR No. 296 issued by the Bureau of Standards discusses the origin and development of the research associate plan whereby various organizations maintain research workers at the Bureau of Standards where they have available all the Bureau's facilities for conducting research as well as the advice and information from the staff of experts maintained at the Bureau.

At the present time 36 organizations, most of them national in scope, maintain 61 research associates who are engaged in seeking the solution for problems of particular

importance to the organizations they represent. For example, the Society of Automotive Engineers maintains four research associates who are conducting investigations on the use of fuels in automotive engines.

Individual organizations as well as national or industrial associations are at liberty to establish research associates at the Bureau and the circular gives the many advantages which may be gained from this cooperation between industry and the Government.

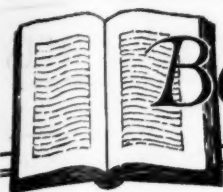
A CHANCE in the tolerances of ball bearing bores and outside diameters has been proposed by the Standards Committee of the German Industry. As compared with the present standard German tolerances the makers are to be given slightly more leeway. The present and proposed new tolerances are given in the table below:

Bore and outer diameter in mm.								
3	30	50	80	120	180	260	360	
to	to	to	to	to	to	to	to	
30	50	80	120	180	260	360	500	
New tolerances.								
+ 0	0	0	0	0	0	0	0	0
-0.010	0.012	0.015	0.020	0.025	0.030	0.035	0.045	
Old tolerances.								
+ 0	0	0	0	0	0			
-0.010	0.012	0.014	0.018	0.022	0.027			

TWO contracts for aerial services have been closed by the Italian Government recently. One is for a service between Turin and Trieste. The agreement with the operating company, the Italian Air Transport Company, covers a period of ten years and calls for three flights per week to begin with, and daily flights later on. The Government will pay the operating company a subvention proportional to the number of miles flown. While the line extends from Turin to Trieste, Pavia and Venice will be touched en route. The other line referred to is to connect Rome with Barcelona, Spain, by way of Genoa, and is to be operated by the Aerial Transport Company of Genoa. At first two flights are to be made per week, and later this service is to be made a daily one also. The intention is said to be to eventually connect up Barcelona with Rome, Brindisi and Constantinople. The service will be conducted with Dornier-Wal all-metal hydroplanes with two 450 hp. Jupiter engines.

THE Siangyang-Shasi and the Laohokow-Huayuan automobile roads, Hu-peh Province, Central China, were opened for traffic some time ago, states a recent issue of the *Chinese Economic Bulletin*. The sectional roads linking Siangyang and Laohokow, Shayang and Shihlipu, and Kingmen and Kienyangyi, have also been completed. The Hankow-Ichang road, which will be some 270 miles in length, is now under construction. A section of approximately 40 miles of this road has been opened to traffic. The Hankow-Ichang Long-Distance Motor-Bus Service Company, a private concern under government control, has been organized. The automobile road linking Ningsia and Lanchow, Kan-su Province, North Western China, has now been completed. Ten cars have been despatched from Kalgan to make trial runs on the road, which is over 200 miles in length.

THE French Scientific Committee on Petroleum is carrying through an investigation on anti-detonants, on which subject reports were made to it recently by Messrs. Moureu and Rateau. It has also been decided to make an investigation regarding fuel economizers.



Books for the Business Bookshelf

Aeronautical Meteorology

"AERONAUTICAL METEOROLOGY" by Willis R. Gregg, of the United States Weather Bureau, published by Ronald Press, New York, is a valuable addition to the flyer's aeronautical library. With the development of commercial flying a broader study of air conditions, their causes and effects, is necessary to the training of pilots and operators. "Aeronautical Meteorology" is written with this object in view and gives in concise form the various factors involving air conditions. Mr. Gregg, through his association with the United States Weather Bureau, has been able to give an outline of methods of weather forecasting as used by the Weather Bureau explaining also how more detailed information than that contained in official weather reports can be obtained by the flyer. Illustrations of cloud formations and charts showing the methods of weather forecasting, etc., help to make the book of interest to all interested in aeronautics.

Carbureting and Manifolding

THE Economics of Carbureting and Manifolding is the title of a new volume by Robert W. A. Brewer, published by Crosby, Lockwood & Son of London. The author, though an Englishman, has been in this country for about ten years, and the book is based largely on American experience and experimental work. The title is rather narrower than the scope of the book, because not only the economics of manifolding and carbureting, but most of the general problems connected with these subjects are touched upon. The book deals to a considerable extent with the work done on manifolds for automobile engines by the author, from 1912 or 1913 on, but the work of other inventors is also given consideration. An abstract of the S. A. E. report on the "Utilization of Present Day Fuels in Present Engines" is given in an appendix. One chapter is devoted to Dilution of Engine Oil, which of course, is closely bound up with problems of carburetion and manifolding.

Duties of a Comptroller

IN the first of a series of pamphlets on the general subject of Business Organization to be published by the Policy Holders Service Bureau, Metropolitan Life Insurance Company, the functions of the comptroller are outlined as they have been determined in various types of organizations. In general, the belief is expressed that the comptroller and treasurer should have quite distinct duties and that the two officers should be on the same basis with neither subordinate to the other.

Tool Engineering

IN the third volume of their series on Tool Engineering, Albert A. Dowd and Frank W. Curtiss discuss the subjects of dies (both forging and punch press), the design of gages for interchangeable manufacture, the limit system, modern drafting room practice, elementary pattern work, feeds and speeds and cutting instruments. As in the preceding volumes the fundamental principles of tool

engineering have been dealt with in as simple a way as possible and applications to specific examples have been shown with numerous illustrations to make the principles clear.

The sub-title of this volume is "Punches, Dies and Gages" and it is published by McGraw-Hill Book Company.

Hydrogen and Helium Production

A FURTHER addition to the Ronald Aeronautical Library published by the Ronald Press Company of New York, "Balloon and Airship Gases," by Charles DeForest Chandler and Walter S. Diehl, forms a very useful and interesting text-book covering the occurrences, manufacture, storage and properties of hydrogen and helium. The first part of the book entitled "Hydrogen and Helium Production Processes; the Compression and Storage of Gases," is as complete as it is possible to make it in a text or reference book of this size. It is to be regretted only that the trade secrets involved in the manufacture of separation of helium do not permit the author to go into greater detail on these processes. However, the general principles are given with an outline of the various stages involved. The second part of the book, "Physics of Gases," by Lieutenant Diehl, covers the fundamental laws of gases, together with deviations to be considered in practice, thermodynamics, and flow of compressible fluids. An appendix contains 21 tables of data on the co-efficients of gases, covering not only hydrogen and helium, but others which have to be considered in the separation and purifying of these two gases.

An International Handbook

A HANDBOOK of the International Automotive Industry has been published by the Finaz-Verlag G. m.b.H., Berlin C-2, Germany. It contains information regarding the organization of automotive manufacturing firms and brief specifications of their products, covering the industries in Germany, Austria, Belgium, United States, France, Great Britain, Italy, Switzerland, Czechoslovakia, Sweden and Hungary. The financial or business information covers the following items: Name and address of firm, telegraphic address, list of active officials, board of directors, bank connections, year of organization, capital stock, participation in other enterprises, membership in trade associations, fiscal year, properties, number of employees, object of enterprise, branch offices. In the case of a good many of the non-German concerns listed this information is missing, however, and only specifications of the product are given, these covering tax horsepower, brake horsepower, cylinder numbers, cycle, bore and stroke, number of gear changes, wheelbase, tread, tires, maximum speed, fuel consumption, chassis and car weight, bodies and prices, trade mark. In addition the Handbook contains information on import duties, a brief history of automobile development in the different countries, lists of automobile associations and publications, a brief dictionary of automobile technical terms in English, German and French, figures on the automobile production of and number of cars owned in the different countries, etc. The text throughout is in German but the headings are in all three languages.

Tons

Tons

Tons

Automobile Men Studying Details of New Design Copyright Bill

Some think it would afford less protection against copying of ornamental designs than present patent laws.

By Leslie H. Allen

HOUSE BILL 6249, which would repeal the design patent laws and substitute therefor copyright protection for industrial designs as a means calculated to speed up the machinery of design protection, has attracted the attention of leaders in the automotive industry and they have been busy studying it and its possible effects.

Some believed that the bill if enacted would:

1. Seriously embarrass industry and harass manufacturers and dealers.
2. Give less protection against infringement than is afforded by the present patent laws.
3. Make possible the copyrighting of designs not now entitled to protection under the existing patent laws.
4. Tend to create monopolies in trivial articles which are now the property of any manufacturer who desires to produce them.
5. Encourage the issuance of copyrights to a number of individuals on substantially the same design, thus opening the way for almost endless litigation and creating such confusion that no manufacturer could be sure that the ownership of any design could be definitely established.

Robert A. Brannigan, manager of the patent department of the National Automobile Chamber of Commerce, sees no very salient, outstanding defect in the present patent, trade-mark or copyright statutes which would require them to be so extensively and radically changed as this bill provides.

Mr. Brannigan points out that it is always dangerous to change old statutes unless there is some very controlling reason for the change, because from the various court decisions the true meaning of the old law becomes known and any change is followed by a period of uncertainty until the new law has been interpreted by the courts.

John Dashiell Myers of the Philadelphia bar believes that every manufacturer and dealer whose products involve industrial designs should have a vital interest in the bill as threatening the development of industrial art and seriously embarrassing industry generally.

As an example of the bill's meaning Mr. Myers says: "If a manufacturer developed at much expense a distinctive and very valuable industrial design and obtained a copyright registration for it, he would be unable to

UNDER the provisions of the bill discussed in this article anything of purely artistic or ornamental nature about an automobile could be placed under copyright protection in substantially the same manner that artists, authors, playwrights, publishers and advertisers now copyright their work.

Patents would be done away with and the copyright process substituted on distinctive designs in such things as bumpers, fenders, lamps, radiator shells, hub caps, sun visors, radiator caps, etc., and to most of the fittings and trimmings of the body as well as the body itself in some cases.

protect his design against anyone else who later, independently and without copying, produced a design identical with his work. Such a manufacturer would have to share his market with the producer of the later design. Naturally there would be little inducement to manufacturers to spend large sums developing distinctive articles only to have their designs duplicated later by competitors who would share in their commercial possibilities. Should such a manufacturer seek protection in the courts, he could not obtain relief under his copyright unless his competitor's design was in fact copied from him, an obviously difficult point for proof. This difficulty is not now raised at all, as the test of infringement

under the design patent laws is based solely on substantial resemblance."

Mr. Myers also points out that under this bill a concern marketing an article of particular design which had been common property for many years would be open to attack at any time under a copyright registration which could be readily obtained by another for an identical, or substantially identical design, and there would be no infringement unless the design could be proved to have been copied.

"As copyrights are registered as a matter of routine and without examination," Mr. Myers adds, "the door would be open for the unscrupulous readily to cloak themselves with copyright registration and the way of the pirate would be made easier.

"Creators of designs which meet the requirements of the patent laws," says Mr. Myers, "will scarcely be willing to accept a monopoly of less value in order to avoid the short delay involved in examination.

"Copyright is not an appropriate form of protection for industrial designs, because it has been developed to deal with literature and the fine arts. Industrial designs, because of their relation to the useful arts, involve conditions of a different kind and which are more analogous to those under patents than under copyrights."

The opinion has been expressed that the only change in design protection that might be worth while would be to permit in design patents a plurality of graded claims, just as in mechanical patents. The criticism is made that a design patent does not hold water unless the alleged infringement is a Chinese copy and that any little quirk of difference would avoid infringement.

EDITORIAL

Prices

PRICE changes in passenger car lines have been few and far between in 1926. Those which have been announced show no definite trend when put together. Only eight or nine revisions have been made since the New York Show, although about a dozen lists were altered around that time. The number of companies making increases since the first of the year is just about balanced by the number making decreases.

Study of the individual changes reveals a specific reason for the particular price movement in almost every case.

But throughout the last four months neither of the two major economic forces which influence price adjustments have been functioning actively. Material and labor prices haven't fluctuated widely and quantity of production has been held pretty steadily up to a high level; costs, in other words, haven't gone up or down materially for the industry as a whole. Then, sales have been good so that the sting of fierce competition has been absent thus far.

As production begins to fall off in accordance with sales, the desire to hold it to the highest possible levels will make competition much more keen than it has been in recent weeks. Under lowered production conditions, it would be logical to expect a price increase. In the past, however, a decrease usually has followed. Immediate competitive factors have influenced prices more strongly than basic cost trends, particularly when cash reserves were high.

Will history repeat itself?

Checking Up—on Conventions

THE verdict of the dealers and salesmen rather than of the factory executives really determines whether or not a sales convention has been a success. After all, the purpose of the sessions is to influence the men who attend so favorably as regards the product, the factory organization and the company that they will be better able to sell its product in the future. However excellent the meeting may seem from the standpoint of the factory man, it cannot be counted a success unless the dealers and salesmen attending concur in the favorable reaction.

And it isn't so easy to find out the real thoughts of those who attend such conventions. Fear, courtesy, politeness, indifference and a host of other factors operate to inhibit the free flow of opinion in answer to direct questioning in any form from the factory or its representatives. Yet the factory really needs some such check if it is to be sure that it is spending its sales convention money effectively and economically.

That the dealers should like the convention, of course, is not enough. It is desirable that they get out of it at least something of inspiration which can be translated finally into sales effort—even if they don't absorb an overwhelming amount of actual information. Merely to have had a big time would scarcely justify the expenditures necessary. In any case, closer checking of results from an objective standpoint doubtless would permit more efficient sales convention expenditures in the future than in the past.

To check results which, necessarily, must be rather abstract in character, is a difficult task, but efforts to do so are likely to be well worth while.

Color as a Sales Appeal

COLOR has become one of the most important factors in determining the saleability of an automobile. This is probably due to the rapid rise of appearance as a criterion for car selection at the expense of engineering details. The American public probably is not as much interested as it once was in the engine and chassis details of the cars it buys. If a car renders the service the buyers expect they are not greatly concerned with how it is done. At present the belief is gaining ground that almost any make of American car will give service commensurate with its cost, so that interest in engineering design is decreasing instead of gaining ground.

Color is an essential element in the impression made by the appearance of any object and car manufacturers have been quick to realize its value in enhancing the sales value of their products. Cars are being finished in colors which are supposed to bear some relation to the type of service for which the car is to be used. One company goes so far as to learn from the fashion centers in Paris and New York what colors are to be popular during coming seasons so that milady may ride in a car whose exterior and interior finish harmonizes with her gowns and with the prevailing mode.

Lacquer makers are being forced to the limit to provide tones and shades which were unthought of for motor use a few years ago. Black baked enamel, which has always been considered one of the very best finishes available, has been displaced in several instances by lacquers, principally because of the desire for colored fenders and similar sheet metal parts.

Developments in exterior finishes have been closely paralleled by the advancements made by makers of upholstery fabrics so that the color scheme carried out on the body is continued in the lining, seat covering and fittings. Color is a vital factor in selling appeal today.

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

Thursday, May 13, 1926

Three Weeks' Sales Growth Cuts Car Stocks Sharply

PHILADELPHIA, May 13—Greatly expanded retail sales are making heavy inroads into surplus stocks of cars in dealers' hands and at the factories. Each of the last three weeks has shown a substantial gain in deliveries, the arrival of good spring weather having had an immediate effect on the automobile market. Little change has taken place meanwhile in production rates at the factories, although it is possible that before the end of the month considerable curtailment will be brought about.

The April output at United States and Canadian factories of approximately 449,000 cars and trucks is not likely to be duplicated or exceeded this year, in consequence of the unusually high rate of production that has prevailed for six months. In disposing of these vehicles, or in keeping stocks within manageable limits, the dealers have been forcing their markets to an extent possibly never before equalled and it is reasonable to believe that they have reached approximately the limit of expansion.

By the time sales begin to fall off, which is likely to be reached late this month or sometime in June, stocks should be at a low level. The same cannot be said of used cars, as these have been piling up at a disturbing rate. The pressure applied to new car sales has inevitably resulted in too liberal trade-ins and a neglect of sound used car merchandising principles in general.

The consequences of this situation on dealers are becoming widely realized and are the occasion of considerable thought on the part of factory executives. The outlook is that dealer mortality will be heavier than normal this year and this is bound to affect the sales organizations of many of the manufacturers. Those with sound dealers and products in large demand, and therefore with good used car values will gain through the weakening of others in less favored positions.

Truck and bus business is in perhaps the most satisfactory state in its history, with virtually all the important companies showing increases this year.

1000 More Daily Chevrolet Program

DETROIT, May 12—Chevrolet Motor Co. will increase its manufacturing facilities to provide for a production of 4000 cars daily, an increase of 1000 over the present daily capacity. The new facilities will be available by Jan. 1, 1927. Additions will be built to the main factory buildings in Flint, where the motor plant and metal stamping divisions are located.

Factories are now running two 50-hour shifts weekly.

Purchase of Fisher Endorsed by G.M.C.

NEW YORK, May 13—General Motor Corp. directors declared a special dividend of \$4 a share on the common stock today, in addition to the regular quarterly dividends. The board also directed officers to make a formal offer to purchase the entire property of Fisher Body Corp. This offer already approved informally by Fisher directors will be acted upon at a special meeting to be called immediately.

The offer takes the form of paying for the Fisher assets in General Motors common stock on the basis of two-thirds of a share for each Fisher share. This will require authorization of 638,400 shares of new General Motors common, bringing total outstanding to 5,800,000 shares.

All officers were re-elected and no change was made in membership of important committees. Directors of the corporation were re-elected Wednesday.

G. M. C. April Retail Sales 13,901 Over Factory Output

NEW YORK, May 13—April sales of General Motors Corp. to users by dealers broke all records for any month in history, according to a statement just issued by Alfred P. Sloan, Jr., president.

"April retail sales by our dealers," said Mr. Sloan, "were 136,643 cars and trucks compared with 106,051 cars and trucks sold in March, which was the previous high point. The total of retail sales for the first four months of this year is 361,363 against 233,008 for the first four months of 1925, an increase of 55 per cent.

"Sales of cars by the manufacturing divisions of General Motors to dealers in April were 122,742, compared with 113,341 in March. For the first four months, sales by the divisions to dealers were 403,728 cars and trucks, compared with 240,898 in the same four months of 1925, and 275,150 in 1924."

BUSINESS PREPARED FOR HIGHER VOLUME

CLEVELAND, May 13—Replies to a questionnaire mailed to 150,000 business men by E. S. Jordan, president of Jordan Motor Car Co., indicate a general feeling of optimism toward the continuance of good business during the present year. The questionnaire, mailed to representative business men in 45 states, brought the following result:

Eighty-three per cent of replies anticipated increased business in 1926 over 1925.

Purchases would exceed or equal last year's in the same 83 per cent.

Advertising expenditures will be increased in 90 per cent of cases to move increased volume.

Sixty per cent said decreased Federal taxes would aid business.

These statements, said Mr. Jordan, are quite contrary to general tone of business forecasts heard earlier in the year.

The fact that the men replying are engaged in all lines of business and are located in all parts of the country, gives their replies weight as a representative cross-section of business opinion, he said.

Tire Stocks Increase March Bulletin Shows

NEW YORK, May 12—Large inventory increases feature the March statistical bulletin just issued by the Rubber Association of America, Inc. Inventories of high pressure inner tubes increased from 9,966,723 in February to 11,106,395 in March, balloon inner tubes from 2,850,865 to 3,241,677, high pressure cord pneumatic casings from 4,907,181 to 5,159,199, balloon casings from 2,487,498 to 2,626,745, fabric pneumatic casings from 978,152 to 1,217,416.

Production of high pressure inner tubes fell from 3,316,739 to 3,076,338, balloon inner tubes increased from 1,801,922 to 2,196,118, cord pneumatic casings from 1,796,189 to 1,840,268, balloon casings from 1,598,246 to 1,855,022, fabric pneumatic casings from 254,537 to 396,746.

Gottfredson Adds "Six"

DETROIT, May 12—Gottfredson Corp. has added a line of six-cylinder trucks to its present four-cylinder line, all units of the two lines, including the wheels, being interchangeable. Special attention has been given to weight distribution in the design of the new line.

Time Payment Attack Stirs U.S.C.C. Meet

Industry Selling Contracts, Not Cars, Says Banker—Lowers Prices Says Reeves

WASHINGTON, May 12—The automobile industry became the center of a controversy at the opening session of the 14th annual meeting of the Chamber of Commerce of the United States when O. H. Cheney, vice-president American Exchange, Pacific National Bank, New York, issued a warning that present tendencies in installment selling of automobiles were unsound and should be checked. He said:

"A casual glance at the automobile financing field finds chaos. Liberalization of terms has been accompanied by perfunctory investigation and fewer rejections of applications. As a result, repossessions have increased, collection costs increased and losses increased. But these have not yet become painfully high because the country has been prosperous and there have been comparatively few defaults.

"As a result of ruthless competition the automobile industry today is no longer selling automobiles, it is selling installment contracts. It is selling pieces of paper with a lot of legal verbiage which the buyer may or may not understand, and which he may or may not be able to follow out. The buyer is encouraged to shop around for the most expensive car he can get with the lowest down payment and the longest time in which to pay."

Replying to these assertions, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, declared that the automobile industry should not be indicted if an occasional buyer defaulted. He said that time selling of automobiles, on the whole, was sound, and that it had helped many people to own cars who otherwise would have been unable to. The added production enabled thereby he said, had resulted in much lower costs and prices which under automobile selling methods the cash buyer was able to take advantage of.

Opposition Mainly Prejudiced

In other industries, said Mr. Reeves, the cash buyer usually had to pay part at least of the expense of financing. The American people are honest and pay their debts, he continued, and he said that opposition to installment selling usually came from interests unable to profit by the system.

Efforts to pass resolutions on installment selling at the domestic distribution group meeting were unsuccessful.

Aviation will not be fully commercialized in this generation, but eventually the aviation industry will be as large or larger than the automobile business. Capt. E. V. Rickenbacker, vice-president of the Rickenbacker Motor Co. told the transportation group at its session Tues-

day afternoon. At least two generations have been necessary to commercialize all other great transportation inventions.

The insurance advisory committee of the Chamber recommended that the national body oppose the principle of compulsory automotive insurance.

Fred J. Haynes, chairman of the board of Dodge Bros., Inc., was reelected a member of the board of directors.

Stinson Aircraft Corp. Starts Operations June 1

DETROIT, May 11—The Stinson Aircraft Corp., incorporated for \$300,000, will start manufacturing airplanes in a factory at Northville, Mich., about June 1, it was announced this week after a board of directors had been elected.

Directors of the corporation are: J. K. Livingstone of McNaughton, Livingstone & Griffin; Luther D. Thomas, president of the Fidelity Trust Co.; Richard Fitzgerald of Lybrand, Ross Brothers & Montgomery; Henry E. Hurd, capitalist; Frank W. Blair, president of the Union Trust Co.; Harry Graham, president of Owen & Graham; George M. Holley, president of the Holley Carburetor Co.; E. S. Evans, Edward A. Stinson, designer and builder of the plane; William A. Mara, secretary aviation committee, Detroit Board of Commerce; George E. Buchanan, president of Buchanan & Huff Coal Co., and William E. Metzger, capitalist.

The plane which the company will build was designed by Stinson. It is of the four or five-passenger enclosed cabin type, with the cabin heated and ventilated. It has brakes on the wheels, adjustable stabilizer and a self-starter for the motor. The power plant is a 200 horsepower, air-cooled Wright whirlwind motor.

Byrd Used Fokker Plane With 3 Wright Engines

PHILADELPHIA, May 13—The plane used by Commander R. E. Byrd in his successful flight on May 9 from Spitzbergen to the North Pole, to Greenland, and back to Spitzbergen, a distance of some 1700 miles, was a standard Fokker F VII monoplane powered with three Wright whirlwind engines of 200 hp. each. For the purpose of this and other flights in the Arctic the seats were removed from the cabin and gasoline tanks of large capacity were installed.

Drop Forging Program Set

CLEVELAND, May 13—The annual drop forging industry convention of the American Drop Forging Institute will open at the French Lick Spring Hotel with an afternoon session on May 20. Business sessions will be held on the morning of the 21st and 22nd.

Fageol Purchase Off

NEW YORK, May 13—Negotiations for sale of Fageol Motor Co. of California to the American Car & Foundry Co. have come to an end because of inability to agree on terms.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, May 13—Retail trade felt the stimulating effects of good weather last week, while wholesale trade and industrial activity continued to decline moderately. Generally speaking, weather was favorable for crops, and the agricultural season, while somewhat late, was considered fairly satisfactory. The level of commodity prices rose during the week, while stock prices were irregular and, on the whole, slightly lower.

RAILROAD EARNINGS

Net operating income of Class 1 railroads in March amounted to \$94,522,911. This represents an annual rate of return on tentative valuation of 5.80 per cent, as compared with 4.61 per cent a year earlier.

BROKER LOANS

Loans to members of the New York Stock Exchange by local banks declined \$164,377,658 during April, amounting to \$2,835,718,509 at the end of the month. The decrease during March amounted to \$535,494,154.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended May 5 were 10.9 per cent above the total for the preceding week and 2.6 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 151.2 last week, as against 150.2 a week earlier and 150.7 four weeks earlier. Bradstreet's index declined nearly 2 per cent last month, the figure for May 1 being almost 11 per cent below that for December 1 last.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks increased \$53,800,000 during the week ended May 5, with gains of \$33,500,000 in discounts, \$14,400,000 in open market purchases and \$6,500,000 in Government securities. Note circulation rose \$10,000,000 and deposits \$43,900,000, while reserves decreased \$3,500,000. The reserve ratio declined from 75.7 to 74.5 per cent.

Loans of reporting member banks increased \$78,000,000 during the week ended April 28, loans secured by Government obligations rising \$2,000,000, loans secured by stocks and bonds \$27,000,000 and "all other" loans \$49,000,000. Investments declined \$3,000,000, while borrowings from Federal Reserve banks increased \$58,000,000 and net demand deposits \$15,000,000.

MONEY

Call loan rates ranged from 3½ to 4½ per cent last week, as against 3 to 4½ per cent a week earlier. Time loan rates were 3¾ to 4¾ per cent, as compared with 4 per cent at the close of the preceding week. Rates on commercial paper were unchanged at 4 to 4½ per cent.

Four Months' Output Indicates Total of 3,997,685 for 1926

**First Quarter Reports of Earnings Show Aggregate Increase
for Leading Companies in Excess of 50 per cent—
Parts Maker Earnings Higher**

NEW YORK, May 10—With April passenger car and truck production 449,173 as estimated by shipping reports submitted to the National Automobile Chamber of Commerce, total production in the United States and Canada during the first four months this year stands at 1,599,074 compared with 1,344,911 in the 1925 period, 1,478,777 in the 1924 period and 1,288,214 in the 1923 period.

This is an increase of 254,163 or 18.89 per cent over the 1925 period, 120,297 or 8.13 per cent over the 1924 period and 310,860 or 24.13 per cent over the 1923 period.

In 1925 production during the first four months represented 31.17 per cent of the year's total; in 1924 it was 40.62 per cent and in 1923, 31.21 per cent.

Using the 40 per cent as the basis of a conservative estimate—that is, assuming that the 1,599,074 production during the first four months this year represents 40 per cent of the year's output, a total production of 3,997,685 for 1926 is indicated.

There is nothing scientific about this estimate, but it is interesting as one means of supporting the contention of those who believe that total output this year, though exceeding that of 1924, will fall somewhat below the record production last year and slightly short of the previous output record in 1923.

First Quarter Earnings High

First quarter earnings reports so far made public show that 13 car companies realized a net income of \$59,757,574 compared with \$39,592,192 in the first quarter of 1925, an increase of a little more than 50 per cent. In three instances these reports covered the fiscal quarter ending Feb. 28; in the other ten they covered the calendar quarter ending March 31. Decreases were reported by Jordan, Dodge, Hudson and Paige-Detroit.

Most of the companies reporting gains made new high net earnings records during the first quarter and a comparison of stock quotations with per share earnings indicates that prices with one or two exceptions have closely followed the trend in earnings and are in line with former years.

The ten manufacturing concerns in the parts and accessories fields whose reports are now available show combined net earnings of \$6,570,339 compared with \$5,751,560 in the first quarter last year, an increase of \$818,779 or a little more than 14 per cent.

Kissel Uses Parabeam

HARTFORD, WIS., May 13—The Kissel Motor Car Co. has announced the adoption of Parabeam headlights as standard equipment on all Kissel cars. This lighting system uses a double filament bulb of 21 c. p. for each filament.

2 New Body Models Are Added by Star

**Convertible Roadster and Delivery Car on "Four" Chassis
and Sport Roadster on "Six"**

NEW YORK, May 10—Durant Motors, Inc., announces a new convertible roadster in the Star "four" line and a new sport roadster in the "six" line, the former priced at \$540 and the latter at \$910 f.o.b. Lansing.

The commercial box on the "four" roadster can be removed and the rear deck cover substituted, thus converting the commercial car into a passenger roadster and vice versa. To leave the rear of the car unobstructed for loading, the tire carrier is mounted on the left running board.

The Star "six" sport roadster has a streamline Hayes-Hunt body with khaki top and rumble mounted on the standard Star "six" chassis. Finish is artillery gray below the black belt line and beige brown above. Seat cushions and backs are upholstered in grained, gray Spanish leather.

Front seat is 18 x 40 and rear 16 x 38. Steering wheel is 17 inches in diameter with natural wood rim, aluminum spider and center horn button. The wheels in natural wood finish are equipped with 29 x 4.40 tires.

Standard equipment on the "six" roadster includes: nicked cowl and head lights; plate glass windshield wings; Moto Meter mounted on a lock radiator filled cap with nicked wings; double-bar nicked front bumper and nicked double-bar rear bumperettes; spare tube and extra tire; black tire cover; slip-on top cover; nicked kick plates; nicked step plates on rear fenders; front snubbers.

Detroit Deliveries Mount

DETROIT, May 8—New car and truck sales records for Detroit in April show that during the month 10,509 passenger cars were sold, a gain of 1717 over a year ago. Truck sales aggregated 1078, compared with 704 a year ago. Closed

cars continued to gain over open models. Sales for the month were 8847 and a year ago totaled 5841.

The first four months of 1926 registered a substantial sales gain over the same period of a year ago. Passenger car sales for the period total 26,722 and a year ago aggregated 22,596. A total of 3083 trucks were sold. The figure a year ago was 2375.

Nash-Ajax Business Shows 70.9% Gain

KENOSHA, May 12—Nash-Ajax sales in April showed an increase of 70.9 per cent over business in the same month last year, according to E. H. McCarty, general sales manager. Exclusive of Ajax the percentage of increase for Nash alone approximates 35 per cent.

April also marked the twentieth consecutive month, with one exception, that Nash business has shown an increase over the corresponding month the year before, according to Mr. McCarty. The one month in which this record was not maintained was November, when new model presentation interfered with production.

The last six weeks have been the greatest in point of bona-fide retail deliveries that the company has known, Mr. McCarty said. Volume of used car sales by dealers during this period was also larger than at any previous time. This is a healthy condition and reflects credit on the dealer organization, he said, as it indicates the effort made to balance new car business with used car movement.

"We are very well satisfied with the way business has been going during 1926," Mr. McCarty said. "The year is only one-third behind us and total shipments constitute 57.7 per cent of the entire shipment during 1925, the company's biggest year. Comparing this four-month period with the corresponding period in 1925 reveals a gain of 89.4 per cent."

Conditions Favor Trade, Says Nash

KENOSHA, WIS., May 13—Just back from California and the Northwest, C. W. Nash, president of Nash Motors Co. and Ajax Motors Co., sees every indication of a continuance of good business on the Pacific Coast and elsewhere throughout the balance of 1926. In summing up the general business outlook, Mr. Nash declared that crop conditions, together with "confidence inspired by the present administration in Washington," justifies the optimism that seems present everywhere.

Stutz Shipments Higher

INDIANAPOLIS, May 12—Stutz shipments in April totaled 652, an increase of 125 cars over March, according to report of E. S. Gorrell, vice-president, to the board of directors. New orders received during the month totaled 657. Unfilled orders on the books as of April 30 represented a value of approximately \$7,000,000.

4 New Closed Bodies on Moon and Diana

Indirect Cowl Ventilation is
Feature—New Color Com-
binations Are Used

ST. LOUIS, May 12—New body models on the Moon six and the Diana eight were announced this week by the Moon Motor Car Co. The models in each case consist of a brougham and a four-door sedan. The Moon brougham lists at \$1395, four-door sedan, \$1545, Diana brougham, \$1995, and four-door sedan, \$2195.

All four bodies are of composite steel construction. The Diana brougham body is nine inches longer than in previous models. The doors are 37 in. in width, or five inches wider than heretofore. The rear window has been lengthened to correspond with the added length of the door window. The roof rail is slightly curved from the center forward, in order to blend into the curved visor.

Both the Moon and Diana brougham and four-door types are equipped with a windshield which, while being operated by the same method as on previous models, is so arranged that a slight raising of the glass will cause a current of air to enter the car underneath the cowl and behind the instrument board, while a still greater raising of the glass causes a direct horizontal current of air to enter in addition to the currents above.

Both Moon and Diana brougham bodies are finished in a two-tone green, highly polished, the upper part of the body and the Diana lance-head being black. The belt, between the upper and lower moldings is finished in sage green, while the color between the lower belt is Brewster green medium, the moldings being blocked off with a cord light green stripe around the middle molding and also following the raised molding of the lance-head on the cowl. The Moon brougham is trimmed in Velroy and the Diana brougham in blue-gray mohair. The hardware is of triple plated special Butler finish.

Rich Interior Fittings

The body of the new Diana four-door de luxe sedan is finished in two-tone gray with black on the upper body and the lance-head. The gray combination is cactus and Yucca gray, the lighter shade being used around the belt and the darker shade below the belt molding. A bright green stripe is used on the molding and outlining the lance-head. The upholstery is blue-gray mohair with a carpet of thick pile to match. Other features include a silk robe rail, dome light, vanity and smoking case finished to match the upholstery. Silk curtains are fitted not only to the rear window, but also the rear corner windows. Other equipment includes silk hoist cords, heater, hardware of new classical design, pockets in the rear doors and a foot rail designed for comfort.

General Motors Statement Shows Record Sales in All Car Lines

NEW YORK, May 10—Alfred P. Sloan, Jr., president, General Motors Corp., in commenting on the corporation's financial statement for the first quarter this year says:

"A comparison of sales and earnings for the current quarter, as compared with the corresponding periods of 1925 and 1924 may be summarized as follows:

	First Quarter 1926	First Quarter 1925	First Quarter 1924
General Motors sales to dealers.....	281,449 cars	155,432 cars	215,550 cars
Dealers' sales to users.....	224,616 "	135,883 "	140,786 "
Net earnings (after taxes).....	\$40,644,577	\$18,903,489	\$22,728,462
Amount earned on common stock.....	38,733,942	16,993,129	20,997,398
Earned per share on common stock.....	\$7.50	\$3.29	\$4.07

"Dealers' sales to users were 224,616 cars, compared with 135,883 for the corresponding period of 1925, an increase of 65.4 per cent, and with 140,786 for the first quarter of 1924, an increase of 56.7 per cent. This constitutes a new record of dealer sales to users for the first quarter, while the corporation's sales to dealers, 281,449 cars, established a new record for any quarter of any year. The corporation enters the second quarter of the year, which is the period of heaviest retail demand, with dealers' stocks ultra-conservative when measured by the trend of retail sales.

"This record volume of business, in the opinion of the corporation, is public recognition of the great value that General Motors is offering in all of its cars at this time.

"Sales of the Pontiac, exhibited for the first time in January at the automobile show, amounted to well over 10,000 cars in the first quarter, and would have been larger if production could have been increased rapidly enough to meet the demand. This constitutes a record for the industry for the first three months' sales following the introduction of a new car.

Oldsmobile sales were 93 per cent more than in the first quarter of last year. Chevrolet sales set a new high quarterly record and also a new high monthly record with the sales of 66,475 cars in March. Chevrolet is now averaging more than 3000 cars a day. Buick sold more cars in the first quarter than any other maker of six-cylinder cars which, considering the high average retail value per car, represents a remarkable merchandising achievement. In addition to introducing Pontiac, the new car, the Oakland division increased the sales of Oakland cars 96 per cent over the first quarter of last year. Cadillac operated at the highest rate in its history, and in the first quarter increased sales by 75 per cent over last year.

"The corporation will adhere strictly to its established policy of building a car for every purse and purpose, with quality at all times foremost, and having the greatest value in each price class that the great purchasing power, large financial resources, engineering skill, manufacturing ability and world-wide distributing organization make possible."

Chrysler "70" Prices Reduced \$50 to \$200

DETROIT, May 10—The Chrysler Corp. has made reductions in its 6-cylinder "70" line ranging from \$50 to \$200. The changes are:

	New Price	Old Price
Coach	\$1395	\$1445
Roadster	1525	1625
Royal coupe	1695	1795
Brougham	1745	1865
Sedan	1545	1695
Royal sedan	1795	1995
Crown sedan	1895	2095

Buick Sets N. Y. Mark

NEW YORK, May 8—Breaking all its previous monthly records, the Buick Motor Co. here reports 3842 new Buick deliveries in April. The largest previous monthly volume of deliveries was in April, 1923, when 3064 cars were delivered. March broke that record with 3187 deliveries, but April exceeded March by 655 cars.

In the New York branch territory, 4709 cars were delivered at retail to consumers, exceeding the former record, April, 1923, by 1500 jobs.

Mack Truck Sees April as Banner Sales Month

NEW YORK, May 8—Mack Trucks, Inc., for the quarter ended March 31, reports net profit of \$2,315,529 after depreciation, estimated Federal taxes and other charges, equivalent, after providing for the 7 per cent dividend requirements on first and second preferred stocks, to \$3.32 per share on 611,515 shares of no par common and comparing with net profits of \$1,754,869 or \$4.33 on 339,730 common shares in the first quarter of 1925.

Sales in the first quarter increased 28 per cent in dollar value over the first quarter in 1925. Indications are that April established a new high record for monthly business.

Men of the Industry and What They Are Doing

Zenith President Finds French Industry Active

V. R. Heftler, president of the Zenith-Detroit Corp., home from France, brings reports of steady business. There is no unemployment in France and wages are at a high level. In the Zenith factory at Lyons, all departments are working full time and some are compelled to operate both day and night.

Fully 10 per cent of the production of the French plant is for airplane use. In this respect the French factory differs from the Detroit factory, which has not a large demand for airplane carburetors.

While there is not yet sufficient demand in America for airplane carburetors on a large production scale, the company, said Mr. Heftler, is equipped to produce them in quantities when they are required.

In France, government and commercial aviation is still far advanced over that in the United States, he declared. The French government is laying special stress in encouraging French manufacturers in the production of aircraft.

Trailer Officers Change

E. L. Moorman, formerly general sales manager of the Highway Trailer Co., Edgerton, Wis., is now specializing as sales manager of the municipal sales division of the company. C. F. Bunker, has joined the company as sales manager of the public utilities division. H. F. Kanauer, formerly with Auburn Automobile Co. and S. F. Bowser Co., heads the commercial division as sales manager, directing sales promotion and factory branches. Four new factory branches are to be announced.

E. J. Cosgrave Joins Fox

E. J. Cosgrave, formerly sales manager of Eaton Axle & Spring Co., is now representing the Gustave Fox Co., of Cincinnati, in the Detroit district. Mr. Cosgrave is widely known in the industry, particularly in the Detroit district.

Herman Ely With Servel

Herman Ely, recently resigned as vice-president and treasurer of the Timken Roller Bearing Co., has been elected vice-president and treasurer of the Servel Corp. of New York. Mr. Ely has departed for the East to assume his new duties.

Walker Purchasing Agent

G. L. Walker, former vice-president of the Root & Vandervoort Engine Co., has been appointed purchasing agent for the Illinois Oil Co. of Rock Island. The office is a newly created one with the oil concern, and he has assumed his duties this week in the Rock Island headquarters.

MOON CHANGE JOINS SALES AND SERVICE

Hiram Neuwoehner has been appointed assistant sales manager of Moon Motor Car Co. Until this appointment Mr. Neuwoehner had been service manager of the company. The change has been made by Moon to bring its sales and service divisions into closer relationship. In two years of service direction Mr. Neuwoehner achieved marked success in satisfying the requirements of dealers and owners.

Phillip Glick, formerly assistant service manager, is promoted to the direction of this department.

Both men are veterans of the Moon organization.

J. A. Cleary with Dorland

John A. Cleary, formerly director of advertising and sales promotion for the Cadillac Motor Car Co., and the Peerless Motor Car Co., has been appointed Florida branch manager of the Dorland Advertising Agency, with headquarters in Miami.

Blanchard Joins Rivett

F. C. Blanchard, formerly vice-president in charge of engineering and manufacturing of the Detroit Lubricator Co., has become associated with Rivett Lathe & Grinder Corp., Boston.

Smith with Standard Gas

O. H. Smith, who resigned as Chicago branch manager of the American Bosch Magneto Corp., recently, has become associated with the Standard Gas Engine Co., Oakland, Calif., with whom he is developing the distribution of Hamilton transmission for Fordson tractors. Mr. Smith is opening headquarters in Cleveland.

Piper Joins Cincinnati

Robert Neal Piper has joined the Cincinnati Shaper Co. in the capacity of sales engineer. He was formerly sales representative in the Buffalo territory for Natco.

Kempner Takes Over Sales

H. Kempner has been appointed sales manager of the "Lo-Hed" electric hoist division of the American Engineering Co. Mr. Kempner has been in charge of sales promotion work for American Engineering Co. for the past three years.

New Radio Directors

Radio Corp. of America has elected the following directors for three years: Gordon Abbott, Arthur E. Braun, J. W. Griggs, John Hays Hammond, Jr., and Edward W. Harden.

W. R. Tomlinson Rejoins Billings & Spencer

W. R. Tomlinson has rejoined the Billings & Spencer Co. as vice-president and factory manager. Mr. Tomlinson and F. C. Billings, president of Billings & Spencer, were apprentices together at the Pratt & Whitney Co. From 1900 to 1918 Mr. Tomlinson was connected with Billings & Spencer as works manager, resigning to rejoin Pratt & Whitney with whom he has been until recently. Mr. Tomlinson supervised the moving operations of Billings & Spencer to its new location.

Arthur W. Fox continues as general manager of Billings & Spencer.

Another change recently made is the promotion of W. Roy Moore to sales manager, following the resignation of J. H. Dowd. Mr. Moore was formerly purchasing agent of the company.

Hood Manager for Star

Frank G. Hood, formerly connected with Star Motors, Inc., as special representative of the factory, covering northern California and Nevada, was recently appointed general manager of the company's factory branch in Los Angeles. He succeeds Charles Waller, who has taken a dealership for the Star line in Los Angeles.

G. R. Lundane Resigns

G. R. Lundane, who has been in the industry since his connection with the Thomas B. Jeffery Co. in 1902, has resigned the eastern district sales managership of the Bell Mfg. Co. Mr. Lundane was an engineer and district sales manager for the Rayfield Carburetor Co. for several years, and just previous to his last connection he was for six years New York City branch manager for Black & Decker Mfg. Co.

Weller Acme Truck Manager

J. W. Weller has been appointed general manager of the Acme Motor Truck Co., it has been announced. The entire operation of the company is in his charge in his new office. In the past he has been associated with Gray, Packard, Willys-Overland and Templar.

Lee Heads Export Sales

W. H. Lee has been made export manager of Stevens & Co., 375 Broadway. He was formerly Far Eastern representative of Dodge & Seymour, Ltd., New York City. The appointment was announced by Walter Rinck, who is now general sales manager.

Carey With Duplex

John Carey, until recently sales manager of the United Motor Products Co., Grand Rapids, has been appointed sales manager of the Duplex Truck Co., of Lansing.

Steel Market Drops; Car Buying Steady

Three Sets of Prices on Some Items Reported—General Market Drifts

NEW YORK, May 13—There was little comfort for steel producers in the U. S. Steel Corporation's unfilled tonnage statement which was made public on Monday, and which showed a decrease of 511,959 tons in the Corporation's backlog on April 30, as compared with March 31. A decline had been looked for, but its extent proved an even keener disappointment to the steel trade than to Wall Street.

All sorts of arguments are being advanced to prove that, while the steel market is not as well off as it was during the year's first quarter, conditions after all are not as bad as they are painted in some quarters. One doesn't have to go back more than a year in the steel market's history to find a precedent for the market's present statistical position.

Full-finished automobile sheets, now easy at 4.30 cents, sold at 4.40 cents a year ago, and during the summer of 1925 receded to 4.20 @ 4.25 cents. Cold-rolled strip steel, which is now uniformly quoted at 3.75 cents, Pittsburgh or Cleveland, was about \$5 a ton higher in May, 1925, but showed signs of weakness in that month, and by June the market approached the 3.50 cent level, recovery setting in during July, and by August the market was firm at 3.75 cents.

Automotive buying this month shows some improvement over April demand. Not that orders are impressively larger, but consumers are more regularly and more frequently in the market. Black sheets seem to be the weakest item. There are virtually three sets of prices, that of the leading interest's sheet-rolling subsidiary remaining at 3.35, while the larger independents name 3.25 cents as their selling price and some of the smaller mills appear to be cutting \$2 a ton or more under that figure.

Unless something unforeseen occurs, the market will be permitted to drift along. The leading interest will very likely permit the smaller mills to set the pace in prices, and when the trend is more clearly visible, it will lower prices if such a course should give reasonable promise of bringing out latent orders, or inject firmness into the situation by reaffirming its quotations.

Pig Iron—Routine conditions prevail. The strike on the other side of the Atlantic ferry has furnished conversational pastime, but as for any influence on the market it has been a negligible factor.

Aluminum—Use of aluminum sheathing in 215 passenger cars recently ordered by the Illinois Central for its electrified zone has opened the floodgates of speculation as to the possibility of railroads becoming much larger consumers of aluminum than they have been in

the past. Certain it is that, if the railroads should become heavy tonnage buyers of aluminum, they will not permit the metal's price to be enhanced because of this. Indications point to aluminum production in the next few years keeping step with increased demand. Imports continue at a good rate, and what gap might occur in British shipments as the result of the strike can be easily made up by Norway where the British producer owns plants. The market remains steady at unchanged levels.

Tin—So far the strike has had little effect on the market.

Lead—Fairly active and steady.

Zinc—Producers refrain from exerting selling pressure, thereby steadying the market which shows very little demand.

C. G. Spring Sales Higher; Stock Dividend Declared

DETROIT, May 8—An extra dividend of 10 per cent in common stock was voted by the board of directors of C. G. Spring & Bumper Co. at a meeting here this week. The stock dividend is in addition to the 10 cents a share regular quarterly and 5 cents a share extra cash dividend previously declared. The stock dividend is payable in four instalments.

In a message to stockholders Christian Girl, president, said:

"Sales for the first eight months of the fiscal year beginning Sept. 1, 1925, amounted to approximately \$3,000,000, compared with \$2,350,000 for the first eight months of the previous fiscal year. Earnings are on the same improved basis as sales, despite the fact that selling prices are much lower. The maintenance of increased earnings are the result of much lowered costs.

Orders on the books and prospects for the balance of the fiscal year would indicate total earnings per share for the year equal to, if not greater than, last year."

Deere Officers Returned

MOLINE, ILL., May 8—Officers were re-elected this week at the annual meeting of Deere & Co., the regular dividend of 1 3/4 per cent was declared and a back payment of 1/2 per cent ordered to stockholders of record May 15, payable June 1. This clears up 13 per cent in back payments on dividends on the preferred stock. The officers are: William Butterworth, president; Charles C. Webber, George W. Mixter, Burton F. Peek, Floyd R. Todd, Frank Silloway and Charles D. Wiman, vice-presidents; George W. Crampton, treasurer; T. F. Wharton, secretary and comptroller; Dwight Deere Wiman, Fred H. Cooper and Maurice Block, assistant secretaries.

Seneca Iron Opens Office

CLEVELAND, May 12—Seneca Iron & Steel Co., Buffalo, has opened offices in Cleveland at 915 Guarantee Title building where they will be represented by E. Dorfzaum and T. L. Crossen. Mr. Crossen formerly was sales manager of the Empire Rolling Mill Co., now the Empire Steel Co.

Financial Notes

Mullins Body Corp. for the quarter ended March 31 reports net profit \$107,017 after expenses, interest, etc., but before Federal taxes, equal after preferred dividends to 87 cents a share on 100,000 shares of no par common, and comparing with \$104,096 or 84 cents a share on first quarter of 1925.

Studebaker Corp. of America has declared regular quarterly dividends of \$1.25 on the common and \$1.75 on the preferred, payable June 1 to stock of record May 10.

White Motor Co. has declared regular quarterly dividend of \$1 payable June 30, to stock of record June 15.

Miller Rubber Co. has declared regular quarterly dividend of \$2.50 on preferred, payable June 1 to stock of record May 10.

Timken Roller Bearing Co. has declared an extra dividend of 25 cents a share and regular quarterly of 75 cents, both payable June 5 to stock of record May 19.

U. S. Light & Heat Corp., for the first quarter this year reports consolidated net earnings of \$180,044 after charges but before Federal taxes, comparing with \$174,855 in the first quarter last year.

Chrysler Profit Higher; April Sales Show Gain

NEW YORK, May 8—Chrysler Corp. and subsidiaries for the first quarter of 1926 report net profit of \$4,112,089 after charges but before Federal taxes, equivalent after dividend requirements on the \$8 preferred stock to \$1.35 a share on 2,707,080 shares of no par common. This compares with \$3,501,227 reported by the Maxwell Motor Corp., the predecessor company, or \$1.13 a share on the present Chrysler share basis in the first quarter of 1925.

Walter P. Chrysler says the new Chrysler 60 is now being shipped at the rate of 350 cars a day. Dealers' stocks are said to be liquidating rapidly and retail sales in April were about 30 per cent above last year.

Peerless Sales Increase

CLEVELAND, May 12—Sales by Peerless Motor Car Corp. for April will exceed the March total by \$205,000 according to Edward VerLinden, president. March business was the largest the company had ever enjoyed. Sales are now exceeding production which is at the rate of 65 daily.

Truck May Meeting Set

DETROIT, May 12—The May meeting of Motor Truck Industries, Inc. will be held in Syracuse, N. Y. on the 19th and 20th, the business session being held on the evening of the first day at the Hotel Syracuse and the visit to member plants the next day. The meeting is sponsored by the Brown-Lipe Co., following the custom of the association to meet at invitation of members in different cities in rotation.

Fiat Car Production to Reach 300 Daily

Four Cylinder Model Heads Output—Buys Truck and Tractor Plant

TURIN, ITALY, May 1 (*by mail*)—Immense activity is being displayed in the Italian automobile industry and indications are that during 1926 Italy will attain record production figures. In contrast to this other European countries contemplate only a slight increase compared with 1925.

The Fiat Company at Turin is now producing 220 cars a day, which is the biggest output in Europe, and has plans in hand which will give it a production of 300 a day by the middle of the year. The new 7 hp. model, with a four-cylinder engine of 60 cu. in. piston displacement, is being turned out at the rate of 110 cars per day, and it is on this model that the greatest immediate increase is expected. Two bigger L-head models have been modified, the model 501 in particular, brought out immediately after the Armistice, is now being produced with a Ricardo head, wider track, slightly longer wheelbase, balloon tires and front wheel brakes.

A few months ago Fiat purchased the Spa Automobile Co. of Turin and apparently intends to make use of these works for the production of trucks and motor coaches. The company has also purchased the world's rights for the Pavesi pivoted agricultural and military tractor, the most successful vehicle of its type in Italy.

Lancia Building Trucks

Increased production is reported by Lancia, which is paying more and more attention to trucks and motor coaches. Itala is increasing its output of the six-cylinder 122 cu. in. model designed by Engineer Cappa. In addition, the firm is bringing out a purely sporting and racing type car, having twelve cylinders of only 67 cu. in. piston displacement. The car, designed by Engineer Cappa, has front wheel drive and embodies numerous original features. By boring out the cylinders a few millimetres, the piston displacement is increased to 91 inches, the rest of the car remaining unchanged. While costly to produce, it is believed that there will be a ready sale among sportsmen for this type of car, and according to information they will be seen on American tracks next year.

Isotta Fraschini is continuing on a single straight-eight high-grade model, the output of which is being increased. According to statement, no change of policy is contemplated. Bianchi, of Milan, it is understood, will shortly stop production of automobiles and specialize on motor cycles and bicycles. Citroen and Peugeot are now assembling their smallest models in Italy for the Italian market.

Time sales were introduced in Italy about a year ago and are proving popu-

lar. An effort is being made to extend the home market, which has not been developed to the same extent as in neighboring countries. Probably more than in any other country in Europe, Italy has treated the automobile as an article of luxury or sport, but the tendency now is to develop the utility type of car. Speaking generally, the agricultural classes in Italy have not yet been touched by the automobile, but the home firms, and particularly Fiat, are now turning their attention to this potential market.

Demand for Guayule Speeds Development

TORREON, MEXICO, May 10—That the guayule rubber industry in Mexico is experiencing a big revival is shown by the fact that during the year 1925 a total of 3255 tons of crude guayule rubber were exported from the Torreon district through the port of Tampico. The export figures for the product through the railroad gateways at Laredo, Eagle Pass and El Paso are not available at this time, but it is known that in the aggregate they were considerable. Part of the exports through Tampico were destined to Germany and other European countries, it is stated.

Plans are on foot for the construction of three new guayule rubber factories in this section. It is stated that the available supply of wild guayule shrub in the states of Coahuila, Durango and Zacatecas is sufficient to keep the factories running without interruption for several years. Considerable progress has been made in growing the shrub by domesticated methods.

It is estimated that more than 50,000 acres of domesticated guayule shrubs are now being grown in the territory tributary to Torreon. The factories are at this time dependent wholly upon the wild shrub for their supply.

Michigan Sixth in Exports

WASHINGTON, May 8—Michigan, chiefly through its automotive exports, has become the sixth leading state from an export standpoint, according to statistics compiled and announced by the Department of Commerce. New York, with \$810,416,054 is first, followed by Texas, Pennsylvania, Louisiana, California, and Michigan, the latter exporting last year \$247,210,000 worth of manufactured goods.

Of the Michigan exports automobiles and parts aggregated \$172,676,501, while tractors exported totaled \$24,079,000.

To Hold Aviation Session

WASHINGTON, May 13—The opening session of the first Inter-American Commission on commercial aviation will be held here Monday, May 23, it was decided this week by the governing board of the Pan-American Union. The board acted upon the resolution of the Fifth Pan-American Conference which met at Santiago, Chile, in 1923.

Willys Sees Record in Second Quarter

Says Conditions Now Warrant Great Confidence in Indus- try—Business Increasing

TOLEDO, May 11—Earnings of \$3,250,000 for the first four months of this year after all charges except Federal taxes, and the prediction that a new high earnings and production record would be set in the second quarter, was made to stockholders of the Willys-Overland Co. at the annual meeting today by President John N. Willys.

Linwood A. Miller, vice-president, was named to the board of directors succeeding J. P. Cotton, New York attorney, who represented bankers in the re-organization of Willys-Overland affairs a few years ago and who resigned this year. The new board is made up of John N. Willys, G. M. Jones, G. M. Mather, C. O. Miniger, Rathbun Fuller, T. H. Tracy, J. E. Kepperley, C. B. Wilson, L. A. Miller, H. C. Tillotson and C. B. Mertz.

Mr. Willys said general conditions now warrant great confidence in the automobile industry and in the future of the Willys-Overland company. Earnings of the first four months were equivalent to the year's dividend requirements of the 7 per cent preferred stock and a balance of 75 cents a share applicable to common stock. Of this total March contributed \$1,233,826 and April more than \$2,000,000. May is expected to net \$2,500,000.

There is every reason to expect that the second quarter will result in record breaking net earnings, exceeding the previous high of \$7,284,115 earned in the second quarter of 1925, Mr. Willys said.

Willys-Knight production is now at the rate of 550 daily, double the best production of last year. Sales of this line of cars will exceed 30,000 for the current quarter, or 60 per cent of the total Willys-Knight sales for 1925. Overland "six" sales in May will be the largest in the company's history.

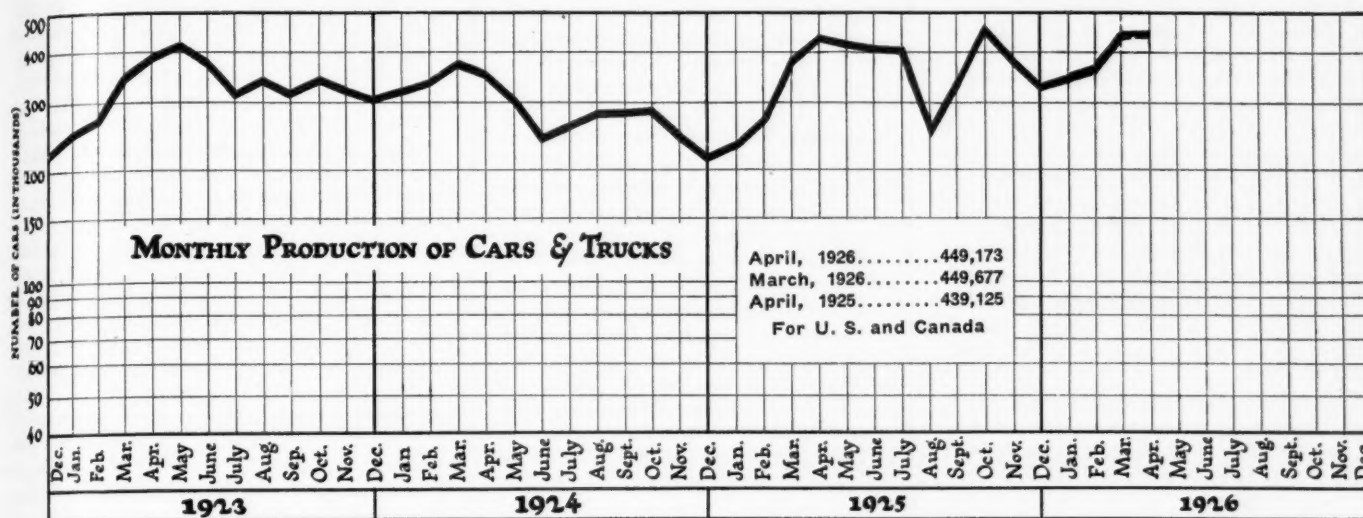
Building Program Concluded

Mr. Willys explained that the program of modernization designed to put the company strongly into the six-cylinder field, and to step up production, will be concluded by the end of the current quarter. Capacity for all models has been increased 50 per cent.

The president's statement showed the company maintaining strong financial position. There is no bank debt and cash balance approximates \$10,000,000. July sinking fund requirements amounting to \$1,000,000 have been purchased.

Officers elected were J. N. Willys, president; L. A. Miller, first vice-president; J. H. Gerkens, vice-president and treasurer; A. B. Qualy, secretary; G. R. Spencer, assistant secretary; E. L. Clapp, assistant treasurer; W. E. Miner, comptroller; H. C. Kruse, cashier.

April Production Maintains High Level



Rim Figures Show Production Lower

CLEVELAND, May 13—Rim production figures for April as listed by the Tire & Rim Association of America, Inc., show a total of 2,284,171 as compared with 2,755,005 in April, 1925, and with 2,471,400 in March this year. For the four months' production is 8,904,275 against 8,871,141 for the first four months last year. Production totals in principal sizes are as follows:

Size	April 1926	April 1925
Clincher		
30x3½	274,168	364,773
Balloon		
28x3½	928,615	1,113,213
28x4	307,427	313,395
29x4	287,539	109,686
30x4½	126,691	98,298
30x5	33,702	38,610
31x5	49,781	42,013
High Press.		
30x3½	16,977	96,084
32x4	29,021	23,468
32x4½	41,277	71,920
Truck "20"		
30x5	65,976	78,137
Truck "24"		
36x6	9,375	5,441

Gardner in Production on Laundaulet Roadsters

ST. LOUIS, May 17—Gardner is now in production on a landaulet roadster model on both the six and eight-cylinder chassis, the list prices being respectively \$1695 and \$2095. When factory-equipped with the accessories furnished on the cabriolet, an additional charge of \$150 is made.

The new models have collapsible tops of Burbank which make it possible to use them either as a coupe or roadster, the change being effected in seven seconds. The windshield is a one-piece, stationary design with side frames containing glass panels which are adjustable for ventilation. The glasses in the doors may be raised or lowered whether

the top is up or down. A thumb screw and catch arrangement secure the top to the windshield when the top is up. From the belt line down, the bodies are identical with the cabriolets. The color scheme is a two-tone green with Choctaw gun metal upholstery.

Buick April Deliveries 7542 Above Shipments

FLINT, May 8—Actual delivery of Buick automobiles to owners, during April, totaled 31,631 units, according to E. T. Strong, general sales manager. The previous monthly record for the current series was made in March, when 23,224 automobiles were delivered.

Factory shipments for April were 24,089, Mr. Strong said, and the excess of deliveries over shipments for the month was 7542 cars.

Buick has broken all previous delivery records in the nine months since August, 1925 with a total of 175,215 cars or an average per month of about 19,500. The factory has been operating at peak capacity since August. The usual mid-winter shutdown for inventory was postponed because of the demand for cars and a \$2,000,000 expansion program to increase capacity to 30,000 cars a month is now under way.

Franklin Shipments Grow

SYRACUSE, May 12—Daily shipments of Franklin cars have increased 83 per cent above the average for April, since the announced reduction in prices, the company declares. Retail deliveries of Franklin cars since Jan. 1 are well ahead of 1925 which was the company's banner year.

Star April Sales High

NEW YORK, May 10—Colin Campbell, vice-president of Durant Motors, Inc., announces an increase in Star factory shipments during April of 20 per cent over April, 1925. March factory shipments increased 30 per cent, February 95 per cent and January 69 per cent over the corresponding months last year.

Tool Builders Act to Standardize Work

PROVIDENCE, May 10—At the annual meeting of the National Machine Tool Builders' Association this week, outstanding interest was manifested in the discussion and movements which should lead to the establishment of standards and standardized practice among machine tool builders. It was felt that the association could accomplish this valuable work for all at little more than individual members are now expending for standardization in their own plants. Action was taken which will lead to the appointment of a standards committee.

The first day opened with an address by the president of the Association and reports of the secretary and various committees. President H. M. Lucas voiced his gratification over the progress which had been made during the year, and gave full credit to the growing spirit of co-operation within the association. He expressed confidence that the continuation of this cooperation would lead to the increased value of the association and benefit to its members.

Four Papers at Club Session

Following the morning meeting, members and guests adjourned to the Squantum Clubhouse where luncheon was served and where the afternoon meeting was held. Everyone was duly appreciative of the hospitality of the Providence members who arranged the enjoyable innovation. Papers prepared by W. L. Churchill, Roy V. Wright, James E. Gleason and C. W. Bettcher were read. The subjects covered included the problem of correct pricing, sale of machine tools to railroads and the advantages of standard practices.

The closing session on Friday afternoon was open to general and prepared discussion on foreign trade conditions; reconditioning and resale; servicing and deferred payments for machine tools and other pertinent problems.

M.A.M.A. Directors Set Meeting Tour

NEW YORK, May 10—Directors of the Motor & Accessory Manufacturers Association will make a first-hand study of business conditions and problems affecting its members, holding meetings in Cleveland, Detroit, Chicago and New York. In each of these cities the principal executives of member companies will be guests of the association at dinner, after which informal discussions will be held on current and prospective business conditions, vital problems of the parts-accessory service equipment industry, and means of utilizing to the fullest degree the association's facilities for meeting these.

The meeting in Cleveland will be at the Cleveland Hotel on May 18, in Detroit at the Statler on the 19th, in Chicago at the Blackstone on the 20th, and in New York at the Astor on the 27th. Local committees in charge of arrangements at each of these cities will be headed by W. M. Albaugh, Thompson Products, Inc., Cleveland; M. A. Moynihan, Gemmer Mfg. Co., Detroit; M. B. Ericson, Biflex Products Co., Chicago; and J. M. McComb, Crucible Steel Co. of America, New York.

The M. & A. M. A. party will be headed by H. L. Horning, president, M. L. Heminway, general manager, and the department heads of the association. Members of the board will invite discussion of members' problems and the association's activities for meeting them, seeking in this way to bring about better understanding and closer cooperation than ever before.

Moves Detroit Office

DETROIT, May 13—Offices of the Packard Electric Co. here will be located in the Stevenson Building after May 15. Detroit representatives are W. E. Marsh and W. S. Haggott.

G. M. FIFTH MILLION SOLD IN 12 MONTHS

NEW YORK, May 11—On May 8, General Motors sold its five millionth car. It required more than nine years to sell the first million but only twelve months to sell the fifth.

In the year ended May 8, General Motors divisions produced and sold 1,002,285 cars and trucks, exceeding all previous records by a wide margin. When the value is considered, the company believes that this constitutes a new record sales volume for the automobile industry.

Sales of General Motors car divisions, by calendar years below, shows that this year's sales, up to May 8, were more than one-half the total sales of 1925:

Year	No. Cars
1910	39,300
1911	35,752
1912	49,696
1913	57,270
1914	61,584
1915	102,388
1916	146,185
1917	203,119
1918	205,326
1919	391,738
1920	393,075
1921	214,799
1922	456,763
1923	798,555
1924	587,341
1925	835,902
1926*	421,300

Total..... 5,000,093

* 1926 figures to May 2.

U. S. Paint Company Builds

PROVIDENCE, May 12—A steadily increasing volume of business has necessitated the addition of another building to the plant of the U. S. Gutta Percha Paint Co., this city. This addition maintains the record of a major building operation every other year.

Federal-Mogul Sets High Output Record

DETROIT, May 13—Production by the Federal-Mogul Corp. in the first quarter of the year totaled 4,040,494 bearings and bushings, establishing a new all-time record for the engine bearing industry. During March, the banner month, production totaled 1,640,212 pieces. Approximately 1,250,000 of these were crankshaft or connecting rod bearings and the remainder bushings.

The figures represent a large increase over the production rate at the time of consolidation of the Federal Bearing & Bushing Corp. and Muzzy-Lyon Co. two years ago when combined production approximated 950,000 monthly. Though the major part of this production was for equipment needs of more than 150 manufacturers, a large percentage was required to meet demand for bearings from the replacement field, in which the company is distributing.

Decrees Holslag Rights

NEW YORK, May 12—A decree has been entered in Federal court here setting up the validity of the letters patent issued to Claude J. Holslag for alternating current welding transformers and for alternating current metallic arc cutting and welding apparatus, which are assigned to the Electric Arc Cutting & Welding Co., Newark, N. J. The decree was entered in the action brought by the Newark company against Earl C. Maxwell Co., Inc. Adjustment of the suit has been made between the two companies, the Maxwell company taking a license under the patents.

Lox-Ford at La Crosse

PHILADELPHIA, May 12—Lox-Ford Lock Co., La Crosse, Wis., is the name of the company manufacturing special automotive equipment, locks and other metal parts, whose name was given as the Ford Lock Co.

Developments of the Week in Leading Motor Stocks

NEW YORK, May 13—Announcement of a reduction in prices on Chrysler closed cars of from \$50 to \$200 announced last week was the outstanding development in the motor share market. While the automobile trade was reassuring in its comment on the reduction and minimized its potential effect as a competitive move on the theory that Chrysler prices by the move were merely being brought more closely into line with prices of other cars in the same general class, the Street placed a bearish interpretation on the reduction and brokerage wires hummed with talk of an impending price war in the motor industry which was likely to sharply curtail manufacturers' profits.

The effect was witnessed in heavy selling of the motor shares, carrying many issues to new low levels on the move.

Chrysler, itself, held firm at between 30 and 31 and appeared to be the least affected by the selling. General Motors and Hudson each dropped several points. Although the brunt of the selling was taken by these two issues, they failed to make new low prices for the year and the losses scored represented only a portion of their recent recoveries. Other motor stocks, under the pressure of steady liquidation and selling recorded new low prices for the year.

Selling of the motor stocks found sympathetic reflection in the rubbers and accessory issues. With the motor shares these groups proved to be the weakest sections in the Stock Market during the past week. Encouraging reports of continued high levels of retail automobile sales, and in the case of some companies, record-breaking profits received little at-

tention in traders' calculations.

The break in the rubber shares was accompanied by reports of impending price reductions as well as prospects that there will have to be some sharp downward revaluations of inventories before the year-end by leading companies due to the fall in crude rubber prices.

United States Rubber was singled out as the leader and declined to a level below 55. Goodrich and Fisk both sold down close to their low prices.

In the accessory group, Fisher Body and Haynes Wheel recorded new low prices while Stewart-Warner held around its lowest price for the year.

Nash, Packard and Hupp continued to show good resistance around former points of support and there was little change in their quotations as a result of the week's operations.—E. S.

California Meeting Sees Air Era Near

Representatives of Cities and Associations Consider Factors of Development

LOS ANGELES, May 8—That commercial aviation in the United States is now entering an era of tremendous development, and that facilities to care for this development must be immediately provided, was the opinion expressed at the California state-wide aeronautical conference held in Los Angeles under auspices of the California Development Association. The conference was the largest aviation meeting ever held in the West, with representatives of chambers of commerce of 25 cities, public utilities, banks, shippers, airplane factories, stock exchanges and government officials in attendance.

The conference lasted for two days and closed with an exhibition of airplanes, airplane parts and equipment held at the terminal of the Western Air Express, Inc., in Los Angeles.

B. W. Burroughs, of the Ford Motor Co., announced to the conference that the first Ford multi-motored airplane, a type toward which the automobile magnate's experts are inclined, will be completed in a few weeks. Mr. Burroughs read a communication from W. B. Stout, director of Ford's airplane department, who said that one year of airplane operation on a commercial basis by the Ford company has left no doubts about the success of commercial aviation. J. H. Kimbelberger, chief engineer of the Douglas company of Santa Monica, also announced that two types of multi-motored planes are being developed by the Douglas interests.

President T. C. Young, of the Western Aero League, advocated designation of fixed air lanes in southern California, with landing fields fifteen miles apart, to encourage commercial flying and reduce its hazards. Capt. Lowell H. Smith, of the "round-the-world" flyers, said it is time to get big business behind commercial aviation.

Jordan Gives Suggestion

Edward S. Jordan, president of the Jordan Motor Car Co., Inc., in a brief address to the conference, said the industry should get down to a production basis and away from "too much tinkering of engineers."

Supt. C. C. Mossley, of the Los Angeles-Salt Lake City air mail line, said speedy transportation is the greatest problem of the country today, and that aviation offers the solution.

E. S. Gregg, chief of the transportation division of the United States Department of Commerce, was one of the principal speakers before the conference.

"Conditions in the United States are the most favorable in the world for air transportation and other commercial uses of airplanes," he declared. "Impressive as is the air situation abroad,

RAIL-AIR SERVICE MAY JOIN CITIES

LOS ANGELES, May 8—Western Air Express, Inc., which holds the government contract for air mail between Salt Lake City and Los Angeles, is negotiating with the Union Pacific Railroad for the transfer of passengers between the two cities by plane, Byron Graves, manager of the airplane organization recently announced. Graves until recently was general manager of the Ford factory branch in Los Angeles, and is now one of the leaders in the development of commercial aviation.

If present plans are perfected, Mr. Graves said, passengers for Los Angeles who wish may transfer at Salt Lake City on their original railroad tickets, and finish the last lap of their western journey by air. Such an arrangement would be the first passenger-carrying union ever perfected between a railroad and an air transportation company in the United States.

there is reason to hope for even greater development in the United States. By reason of geographical extent, freedom from custom restrictions, unified political interests, common business methods and great activity in all forms of transportation, this country has the most favorable future in aviation."

Fonck Makes Plans for New York-Paris Flight

NEW YORK, May 8—Captain Rene Fonck, star ace of the French Air Service, has arrived here to complete plans for his flight from Roosevelt Field, L. I., to Paris, France, next August, in competition for the \$25,000 prize offered by Raymond Orteig, to the first American or Frenchman making a non-stop flight between Paris and New York.

Captain Fonck has requested Secretary of the Navy Wilbur to furnish a list of American naval aviators from which he might choose someone to accompany him.

At a dinner given in his honor by Mr. Orteig, Captain Fonck said that if he won the \$25,000 prize he would give it to the men who built the American-made Sikorsky plane in which he hopes to make the flight.

Noel Davis of the United States Naval Reserve has notified Mr. Orteig that he also plans to contend for the prize.

Authorize 2200 Planes

Washington, May 8—A bill authorizing a building program for army aviation to provide 2200 new airplanes at the end of a five-year period was passed this week by the House and sent to the Senate. The five-year aviation program provides for an expenditure of \$75,000,000 for engines and planes. The appropriations must be provided, however, in separate bills.

Passage of Air Bill Regarded as Certain

Under Terms, Government Would Investigate Accidents and Suggest Remedies

WASHINGTON, May 8—Passage of the Merritt Civil Aviation measure, designed to encourage and regulate the use of aircraft in commerce, now seems an assured fact, inasmuch as the House Committee on Interstate and Foreign Commerce announces this week that its conferees will favorably report the measure for reenactment by both the House and Senate.

Adoption of the new program is expected to lend impetus to engine and aircraft manufacturing, which will be fostered by the government in every way possible, and without any governmental interference which would hamper private industry's expansion of commercial aviation.

The measure would place commercial aviation under the Secretary of Commerce, who would be authorized to appoint a commission to study the possibilities for development of commercial air navigation for the aeronautical industry and trade in the United States and to collect and disseminate information relative thereto.

Whenever there is an accident it is proposed that the government will make an investigation, reporting the cause to the Bureau of Statistics which would make monthly reports to manufacturers with a view to remedying the cause. Another salient feature of the bill would permit private use of government landing fields, with service stations, accommodations, etc., for commercial ships and aviators, something which has heretofore been totally lacking. A network of fields, with night markers would cover the entire United States.

Orders 50 More Buses

NEW YORK, May 7—Public Service Transportation Co. of New Jersey, after first demonstration in service of the new gas-electric deluxe type of automobile buses, has increased its order with the Yellow Truck & Coach Mfg. Co. from 333 to 383.

With the exception of the first 200, the body work and painting are being done in the Newark shops of the Public Service Transportation Co. Delivery is expected to be completed within two or three months.

Seeks American Lines

NEW YORK May 10—A. Rist, of A. Rist, Ltd., Lowestoft, England, will arrive in this country about June 1 to meet American manufacturers of automotive accessories and equipment who wish to make manufacturing or distributive arrangements abroad. Mr. Rist may be reached care of G. W. Sheldon & Co., Ltd., 115 Broad St., New York.

S.A.E. Summer Meet to Hear 37 Reports

NEW YORK, May 8—There are 37 reports with recommendations for changes in and additions to the Society of Automotive Engineers Standards and Recommended Practices to be made to the Standards Committee of the Society by 15 divisions of the committee on June 1, the first of the four days' summer meeting of the S. A. E., which is to be held at French Lick Springs Hotel, French Lick Springs, Indiana. The semi-annual business meeting will also be held on the opening day.

On June 2, the morning session will study "Riding Qualities," with an address by W. C. Keys, Gabriel Snubber Sales & Service Co., on "How Do Cushions and Cushion Springs Affect Riding Qualities?" and one by R. W. Brown, Firestone Tire & Rubber Co., on "Instrumentation and Results of Riding-Quality Tests." In the afternoon there will be an airplane demonstration and airplane photographic exhibition. The subject of the evening session will be "Headlighting Demonstrations." K. D. Chambers, Light and Knowledge Press, will present a "Complimentary-Color Headlighting Demonstration," and the Research sub-committee on headlighting will demonstrate "Testing Equipment and Methods."

Discuss Racing Car Features

At the race session on the morning of the third, there will be informal talks by Fred Duesenberg and others prominent in racing on engineering features incorporated in the cars that participated in the Indianapolis race. The fuels and lubrication session in the afternoon will include these papers: "Causes of Wear and Tear in Engines," by O. M. Burkhardt, research manager of the S. A. E.; "Gasoline Testing," by T. S. Sligh, Jr.,

Coming Feature Issue of Chilton Class Journal Publication

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Bureau of Standards; and "The Influence of Temperature, Fuel and Lubricant in Forming Motor Carbon Deposits," by W. A. Gruse, C. J. Livingstone and S. P. Marley, Mellon Institute of Industrial Research. In the evening K. H. Cummings, Bureau of Standards, will discuss "Possible Solution of the Anti-Freeze Problem." The grand ball will be held that night.

Discuss Hypoid Axle Gear

At the session on the morning of the fourth, A. L. Stewart and Ernest Wildhaber of the Gleason Works will discuss "Design, Production and Application of the Hypoid Rear-axle Gear," and L. D. Buckendale of the Timken-Detroit Axle Co. will deliver a paper on the "Engineering Story of the Worm-Gear Drive. In the afternoon at the tire session, "General Results of the Cooperative Motor Truck Impact Tests," by J. A. Buchanan, Bureau of Public Roads, and J. W. Reid, Rubber Association of America, will be presented. Also "Drop-Center Rim and Tire Developments," by B. J. Lemon of Morgan & Wright plant, United States Rubber Co.

The Society reports that more than 500 members and guests have forwarded reservations and a record-breaking attendance is expected. Many are planning to attend the Indiana Section dinner the evening of May 30 and the Indianapolis races on the 31st. The speakers will be Charles M. Schwab, Arthur Brisbane, and C. F. Kettering.

Retail Stores Show General Betterment

WASHINGTON, May 8—Retail trade, throughout the United States, for the first quarter of 1926, shows a material improvement compared with the first quarter of last year, according to the May survey of the Federal Reserve Board, announced in Washington. Figures of the Board showed that department store sales were 5 per cent larger than the first quarter of 1925. Sales of mail order houses were 7 per cent larger for 1926 period than 1925 quarter.

The increase in department store sales in March this year, over March, 1925, was general for all sections of the country, except in the Minneapolis and Kansas City District of the Reserve Board, where they were about the same as a year ago. The reports were received from 45 of the largest department stores in seven Federal Reserve Districts. Of these, 36 department stores showed larger sales than in March of last year and nine showed smaller sales.

Stocks of department stores increased in March in response to the growth in sales and averaged at the end of the month 2 per cent larger than in March, 1925. Statistics reported from individual departments showed that stocks at 21 departments were larger than in March 1925, and that those of 24 departments were smaller.

Dismiss Kelsey Complaint

WASHINGTON, May 8—Complaint of the Federal Trade Commission charging the Kelsey Wheel Co. of Detroit, and seven other companies, with restraint of trade, through price maintenance, was dismissed this week by the commission because of insufficient evidence, it is announced.

Calendar of Coming Events

SHOWS

- May 25—International Exhibition of Roads, Transport and Touring, Show Grounds, Argentine Rural Society, Palermo, Buenos Aires.
- June 10-20—Third Annual Automobile, Motor Cycle and Cycle Exposition, Geneva.
- July 28—First Peruvian Automobile Show, under auspices Peruvian Touring Club, Lima.
- Sept. 7-10—6th Annual New Haven Machine Tool Exhibition.
- Sept.—Fifth International Road Congress and Exposition, Milan.
- Sept.—Automobile Show, Prague.
- Oct. 4-9—Olympia Motor Cycle Show, London.
- Oct. 7-17—Auto Salon, Grand Palais, Paris.
- Oct. 21-30—Olympia Show, London.
- Nov. 8-13—Convention and Show, Automotive Equipment Association, Coliseum, Chicago.
- Dec.—Show at Brussels.
- End of 1926—Show at Berlin.

CONVENTIONS

- May 17-21—National Electric Light Association and Electric Truck Manufacturers Association, Atlantic City, N. J.

- May 28-29—National Motor Regrinders and Rebuilders Association, Indianapolis.
- June 7-12—Annual United States good roads show and convention, direction United States Good Roads Association, Inc., and Bankhead National Highway Association, Santa Monica.
- June 8-10—Automobile Body Builders Association with manufacturers' exhibit, Detroit, Hotel Statler.
- June 14-19—Automotive Equipment Association, Mount Royal Hotel, Montreal, Canada.
- June 15-16—N. A. C. C. factory service manager's meeting at the Book-Cadillac Hotel, Detroit.
- June 16-18—Thirteenth National Convention, Society of Industrial Engineers, Philadelphia, Bellevue-Stratford Hotel.
- Oct. 4-8—45th Annual Convention, American Electric Railway Association and manufacturers' exhibit, Cleveland Public Auditorium and Annex.
- Nov. 13—Annual Meeting Associated Manufacturers of Fabric Auto Equipment, Inc., La Salle Hotel, Chicago.
- Nov. 15-19—National Standard Parts Association convention and exhibit, Hotel Sherman, Chicago.

- Nov. 16-18—National Tire Dealers Association, Inc., Memphis, Tenn.

RACES

- May 21-22—Tenth Annual Economy Run, Los Angeles to Camp Curry.
- May 30-31—500-mile race, Indianapolis.
- June 12—Flag Day races, Altoona, Speedway.
- June 12-13—Rudge-Whitworth 24-hour stock car race, Le Mans, France.
- June 27—French Grand Prix, Miramas Track, Marseilles.
- Sept. 6—Labor Day races, Altoona Speedway.

S. A. E. MEETINGS National

- June 1-4—Semi-annual meeting, French Lick Springs, Ind.
- Sept. 21-23—Production Engineering meeting, Hotel Sherman, Chicago.
- Nov. 16-18—National Transportation and Service meeting, Boston.

Sectional

- May 17—Chicago, Gasoline Substitutes from Coal.
- May 18—Buffalo, Coincidental Locks.
- May 20—Detroit, Coincidental Locks.